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WHALING OFF THE ALASKAN COAST*

[FROM THE JOURNAL OF JACK HADLEY OF POINT BARROW, ALASKA

The Bering Sea whale fishery opened in 1848. Its object was the capture of the Arctic right whale, commonly known as the bow-head, for whalebone and train-oil. At one time about 300 vessels were engaged in the industry. Most of them sailed from New Bedford, but, of late years, the small remaining fleet has come from San Francisco. Leaving San Francisco in December, the fleet would engage in sperm whaling (the sperm whale, or cachalot) until March and then point for Bering Sea in order to arrive at the ice by the middle of April and drift north with it, waiting and watching for the bow-heads in their spring migration to the Arctic seas. Formerly the ships did not go farther north than Point Barrow to complete their season, but would leave there about September for the west and run along the edge of the pack ice towards Herald Island, off the northeast coast of Asia, picking up occasional whales as they dodged out of the pack and remaining as late as the young ice would permit—usually till between October 5th and 15th, rarely as late as the 25th.

* Just before Mr. Stefansson left New York on his latest explorations in the Arctic, he turned over the manuscript of this paper to the Society. Jack Hadley, the author, is an old-time whaler, who saw the rise and the decline of the Alaskan industry. He is more familiar with the harpoon than with the pen, yet he writes his story in a quaint style and with pleasing directness. His paper, adapted to the present purpose, is presented to the readers of the *Bulletin* as an interesting and valuable contribution to the history of the Alaskan whalery and of the participation of the Eskimos in it.

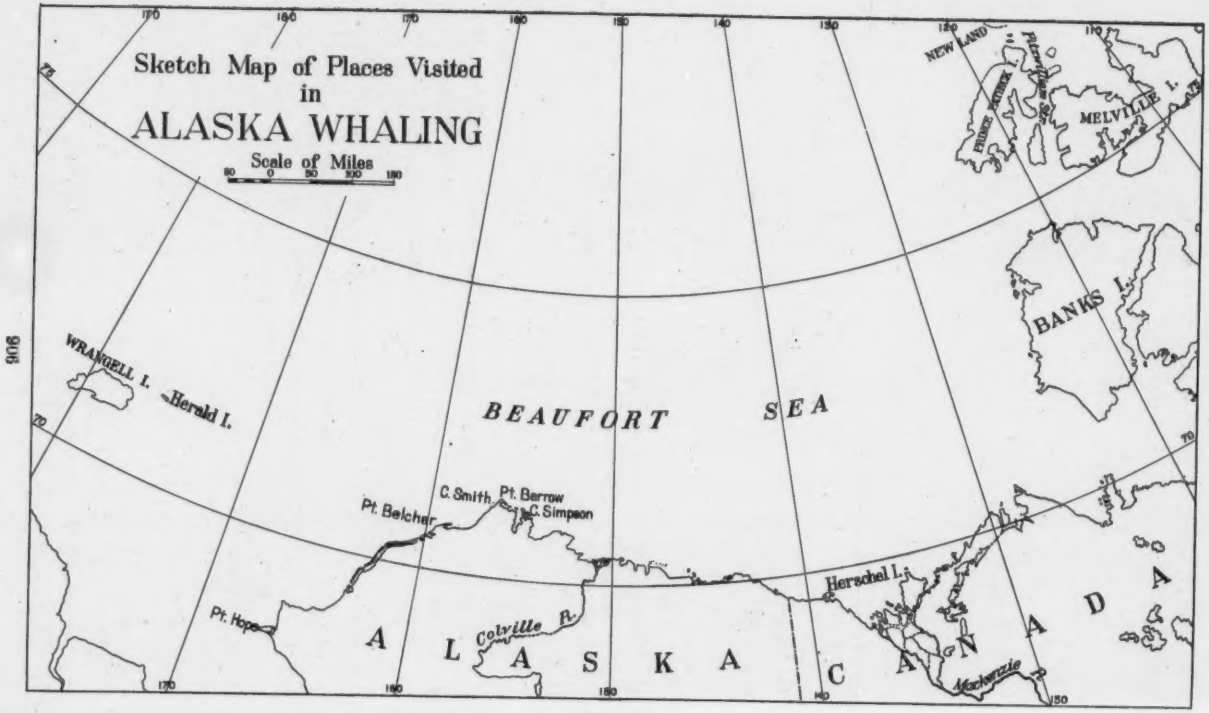
Sketch Map of Places Visited
in
ALASKA WHALING
Scale of Miles
80 0 80 160 240
NEW LAND
FRIDTJOF NANSEN
MELVILLE I.
BANKS I.
WRANGELL I.
Herald I.
BEAUFORT SEA
C. Smith
Pt. Barrow
C. Simpson
Pt. Belcher
Pt. Hope
Colville R.
Herschel I.
ALASKA
CANADA
Mackenzie
70
150
160
170
180
190
140
130
120
110

FIG. 1.

In the early days of Arctic whaling, the whales were plentiful and not easily scared off; but since steam has been put into some of the ships, the whales have left their feeding grounds along the Alaskan border of Beaufort Sea, and now whalers have to go as far east as Banks Island and Fitzwilliam Strait to meet the whales on their return to the west. In the writer's opinion, the main body of whales goes east to breeding grounds off the coast of Greenland. The whales remaining all summer in the pack between Point Barrow and Herschel Island are mostly old bulls, and a species of small Arctic ice whale.

The Graveyard of Whaling Ships. The Alaskan Arctic coast is the graveyard of a large number of the 300 sailing vessels and smaller boats that were formerly engaged in the whaling business. Every few miles along the coast between Point Hope (just outside of Bering Strait) and Herschel Island are to be seen relics of this once important and now rapidly declining industry. These relics are ribs and keels of old wind jammers, now rotting on the beach or used by the natives on their hunting trips to build shacks for protection from the furious blasts of the Arctic winter.

The summer of 1876 claimed the first great toll from the whaling fleet. Thirty-six ships were caught in the ice off Point Belcher and abandoned by their crews, who took refuge on ships that were more fortunate in getting clear of the ice. The ships, having grounded and smashed up close to a native village, would have proved a great windfall for the Eskimo if they had been sufficiently civilized to appreciate it; but, being unaccustomed to the ways of their white brother, they did not realize the wealth of good things sent them by their Spirit of the Ice. Yet they had acquired a taste for whiskey and as soon as the crews were clear of the stranded ships the natives hastened on board in search of the esteemed beverage. Everything they could find in bottles they took along with them, contents of the medicine chest and all, and returned home to enjoy the plunder. It ended in the poisoning of the whole village. At the present day, in their underground houses, may be seen the remains of whole families who died just as they sat, poisoned by the medicine, which, in their ignorance, they mistook for whiskey.

In the summer of 1879 a large number of the fleet got into the ice northwest of Point Barrow and, as it swung round from the south, thirteen of them were caught about forty miles off shore. Their crews, leaving them, walked over the ice towards the ships they could see in clear water to the east. At a few miles' distance, a third of the

men decided to return to their own ships, preferring to take their chances there rather than on the ice, for they knew that missing the ships would mean slow death by starvation or exposure, as they had neither provisions nor clothing. Some of the men on the ice were picked up by the ships and the rest succeeded in making the shore, where they were succored by the natives, taken down the coast to Point Belcher and returned to their homes; but those who remained with their ships were never heard of again. For several years after this the ships made fair voyages with no wrecks until 1888, an unusually bad year for gales of wind and heavy ice, when five more ships were lost; one on Herald Island, three at Point Barrow and one on its homeward trip in the fall, at Point Hope. In 1889, three vessels were lost, including one in Bering Sea and one at Point Barrow. Between the years 1889 and 1897 only two losses are recorded, but during the latter year Old King Ice claimed a toll of four ships. Three of them, returning from Herschel Island, were caught in the ice at Point Barrow and ground to pieces. The crews escaped to the shore, where they remained until the following spring.

The fourth vessel, the *Narvarck* of New Bedford, while on her passage north in the spring, was caught in a pack of old and very heavy ice off Icy Cape and carried north with it, arriving in the first part of August off Point Barrow about thirty miles from shore. After drifting for several days and finding no way open for escape, the master decided to abandon the ship to her fate and to try to gain the government revenue cutter *Bear,* sighted at anchor inshore of them. Three of the boats were provisioned and hauled by the crew over the pack towards the inshore lead. After traveling a few miles a thick fog came down and prevented them from finding a road through the rough ice with their boats; so the master ordered a return to the ship before they lost her. Abandoning the boats and grub, they succeeded in regaining the ship only to start again after a few hours' rest. The master took his wife and mate with a small canvas dinghy, 32 of the crew strung out on the ice walking, and 10 remained on the ship, refusing to leave her. A hard struggle brought the crew to the edge of the water and within sight of the *Bear,* 5 or 6 miles distant; then fog set in again. Meanwhile the master and his party arrived at the revenue cutter and reported the crew as lost. By this time, the ice along the edge of the pack began to break up and a strong current running north separated the party. Small pieces of ice with one, two or three men were floated away. Some of the men were drowned in attempting to jump from one cake

FIG. 2—Eskimo whalers. These men are employed by American whalers on the Arctic coast of Alaska.

to another; others died from hunger and exposure. Sixteen were picked up by the steam whaler from a cake of ice about 20 yards square, but not until they had been many days without food and were so weak that they had to be picked up and carried to the boat. The ship herself drifted in close to Cape Simpson and froze in there and the crew that had remained on her walked ashore, where they were kept by the C. S. W. and Trading Co. until the following spring. In the middle of the winter a northeast gale of wind released the *Narvarck* and she drifted south until off the station at Cape Smith. A change in the direction of the current drove her in close to the beach, where, as fuel, she proved a godsend to the shipwrecked men.

The Brief Boom Time of Herschel Island. I will now tell of the way in which the great whaling industry of Herschel Island was started.[1] In 1888, Joe Tuckfield, a beachcomber of an adventurous turn of mind, hearing from the natives of the many whales to be seen during the summer close to the beach east of Herschel Island, provisioned his boat and hired a family of natives for crew and left Point Barrow for the new road to fortune. He proved rumor to be true in this case, for when he arrived off Key Point, about thirty miles to the east of Herschel Island, there were whales by the hundreds and he succeeded in catching one small one with his crude outfit. It was clearly an opportunity for the whaling fleet; so the following spring he made a quick trip to Point Barrow to spread the news and when the fleet arrived and heard his story the word was given to sail for Herschel Island. However, the country was

1 "The first whaling ship reached Herschel Island in 1889, and for a few years thereafter the industry prospered greatly. It was immensely profitable, and at times as many as fourteen ships wintered in the Arctic at one time. This had a sudden effect on the fortunes of the Eskimo. Before that time they had been in the habit of making summer trading voyages up to Fort Macpherson to buy a few small things, but now, when this large whaling fleet came, all their conditions of life were changed. All of the articles which they had been used to buying, they could now get cheaply or for nothing from the whalers, and they soon learned the use of a great many other articles, the very names and appearance of which were unknown to them before—articles which even the Hudson's Bay factor at Macpherson had been compelled to do without. The ships brought, too, an abundance of provisions. At first the Eskimo would have nothing to do with any of these; but in the course of a few years they learned the use of flour, molasses, sugar, etc., which became first luxuries and then necessities.

"It was important for the whaling ships to get plenty of fresh caribou meat to keep their crews from getting scurvy, and they employed practically the whole population in the pursuit of caribou, fish, and ptarmigan. Such things as flour, hard bread, sugar, canned meats and vegetables, butter, etc., they gave with a free hand to the Eskimo, urging them to use them and to save meat. The Eskimo of course preferred meat as an article of diet, and now they were further impressed with the fact that the white man seemed to consider meat of priceless value and the other food articles of little value or none. Meat, therefore, came to have a fabulous price compared with other commodities, and during the time of my experience in the North, a pound of meat has been worth more than a pound of any article of civilized diet except tea."—From "My Life with the Eskimo" by V. Stefansson, pp. 39–40.

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FIG. 3.

FIG. 4.

FIG. 3—Spring whaling: The forward seven of nine canoes under sails and paddles about six miles off the floe towing a whale to the floe for cutting in. It took ten hours to tow about six miles. May 8, 1912.

FIG. 4—Spring whaling: Cutting for blubber and meat on the floe edge. May 20, 1912.

FIG. 5.

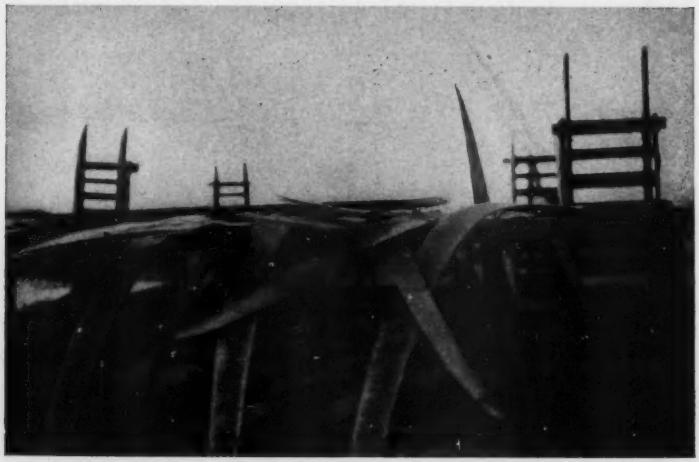

FIG. 6.

FIG. 5—Spring whaling: The upper jaw of a bowhead has been chopped off and hauled on the edge of the floe. Removing the "bone." May 20, 1912.

FIG. 6—After spring whaling is over: Dry "bone" ashore after it has been scrubbed. When it has been dried it is tied in hundred-pound bundles.

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new to the whalers, their stay was short and the catch correspondingly small. The next spring the Pacific Whalery Co. decided to send two of their ships to Herschel Island for a two-winter season. But it was not until the summer of 1891 that they made a catch; then they got about sixty whales and the rush was started. In 1892 more ships came to the island and, in the succeeding three years, 17 ships wintered there. In 1892 and 1893, the greatest season on record, over 300,000 pounds of whalebone were secured and the market was flooded to such a degree that the price dropped from $5 to $2 a pound, from which latter price it has never recovered. At the present moment there are over 300,000 pounds of bone on hand among the different owners and no sale for it.

This period marked the practical conclusion of whaling, for with the success of this industry, as with lightning, "it never strikes twice in the same place." After the ships have made a killing in any spot the whales are chased off to other grounds and only return when forced by heavy pack ice. So as the ships are lost or condemned no others take their place, and at the present time there are only about six whalers in the Arctic Seas.

Life on a Whale Ship. Life on board a whale ship is a continual round of hardship from the moment the Pacific Ocean is left until the moment it is re-entered from the northern seas. During the time the ships are on the western grounds in September and October, whenever a whale is raised, down must go the boats, regardless of the weather, blow high or blow low, perhaps for an all-day and a fruitless chase. The boats drive to windward in a smother of spray that is solid ice when it descends. The unhappy crew return to the ship so stiff and frozen that they are unable to climb on board and have to be hoisted up. Not infrequently they are capsized and have to hang on to the bottom of the boat with cramped hands until the ship steams to windward and picks them up—if the sea does not wash them off beforehand. At other times the ship may be crushed in the ice and the crew left to die from exposure. Such a case happened off Herald Island in 1892. The ship was crushed and sank in three minutes and, of the crew, very few survived the night of heavy seas and freezing cold. The wreck of the *Ohio* at Point Hope in the fall of 1888 is another instance of the hardship and danger attendant on whaling in the Arctic. While homeward bound, a stray northerly gale forced her upon the north side of Point Hope and within a short time she went to pieces. Many of the crew were drowned, others were thrown on the beach and of these about a dozen

managed to find shelter with the wreckage until daylight, when they were succored by the station people and kept until they could be returned home in the following spring. The existence of the whaling station at Point Hope was indeed a most fortunate circumstance, for, from the Eskimos, as they were at that time, little mercy could have been expected. On discovering the castaways, the natives had taken the clothes of several of the shipwrecked men, leaving them naked and undoubtedly would have fed them to the dogs during the winter had it not been for the presence of the white men, who, they knew, would report the matter to Captain Healy of the revenue cutter *Bear* on his return in the summer.

In passing it may be remarked that this gentleman of the old school was the best friend the natives of northern Alaska ever had. In the summer months, when the *Bear* was in the Arctic, things ran pretty smoothly all along the coast.

Eskimos as Whalers. As far back as tradition goes, the Eskimos of northern Alaska have been a race of mighty hunters and whalemen. At every cape and headland, from Bering Sea to Point Barrow, and more especially at the latter and Point Hope, the locations of the largest villages, the passing of the dark days of winter marked the Eskimos' preparations for the great devil dance, the invariable prelude to the spring whale hunt. The dance was supposed to chase away all the devils and evil spirits from the village, so that the oomiak, made of skin, could get plenty of whales. About April 1 all the able men of the village would take their ice-picks and build a road to the water when the ice had disappeared, so that they might conveniently haul thither their boats and sleds and convey back the cargoes of seal, whalebone, meat, blubber and blackskin. On finishing the road and while waiting for the northeast wind to

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EXPLANATION OF FIGURE 7.

Bomb gun, to be fired from the shoulder. The cartridge is shown on top of the breech. It contains 3½ drams of black powder (a bigger load would drive the bomb clear through a whale).

Brass tonite bomb, "feathered" with four springs. The bomb is loaded into the gun from the muzzle after the shell has been inserted from the breech.

Brass tonite darting bomb for darting gun, without "feathers."

Darting gun, showing iron (below) and firing pin (above). When the iron has penetrated till the trigger of the firing pin touches the whale the gun goes off, sending the bomb into the whale. The shell carries 2½ drams of black powder. The bombs are made in New Bedford and loaded in California. The shells are loaded by the whalers themselves. The handle (pole) is about 5 ft. long and about 6 ft. over all (not including the iron).

Blubber hook, for handling pieces of blubber or fat in cutting up a whale. Handle 8 or 10 ft. long.

Cutting spade, for cutting off upper jaw, cutting out "bone", cutting up meat or blubber. "Bone" is later split with axe into 5 slab chunks.

Boarding knife, for cutting holes in flukes or other parts. Blade double-edged, 20 to 24 in. long.

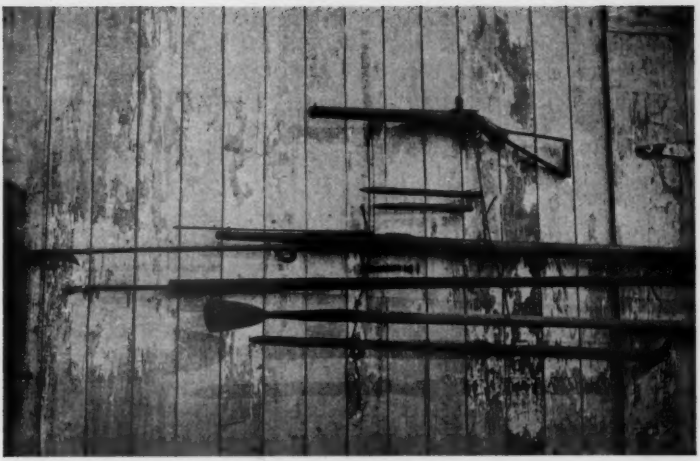

FIG. 7.

FIG. 8

FIG. 7—Instruments used in Alaska whaling. (For description, see footnote on p. 914.)

FIG. 8—Whale boats on the beach in front of the whaling station at Pt. Barrow, Alaska.

open a lead of water sufficiently near shore, they made ready the boats and gear. Their apparatus, consisting as it did of a few fathoms of walrus hide line, fitted with sealskin bladders and tied to a short flint-headed spear, in its turn fastened to a long pole, was primitive enough.

On the first sign of a bow-head whale, all the boats hauled out to the water and took up a position in some comfortable nook along the edge of the ice floe. When the whale came near a boat, the headman, whose place was usually in the stern, turned the canoe head-on toward the ice and taking some fifteen minutes to half an hour about it, would sing the great death song, handed down from some famous whale-killing ancestor. While the rest of the crew launched the canoe on top of the whale, the harpooner, from his station at the head, thrust his flint-headed spear into the whale. It could not do much damage, but would scare the whale nearly to death. As he passed to the next canoe, the same performance, without the song, would be repeated and so on until the number of skin pokes in the whale made it impossible for him to go down. Then the natives paddled to him and finished him off with the flint spears made specially for that purpose. When the whale was dead, all the canoes in the vicinity gathered around and towed him towards the floe where they cut him in pieces—with their crude and primitive methods a sufficiently difficult job.

A slip or runway had to be cut to the edge of the water and the whale was secured by walrus hide lines passed round a sort of windlass constructed from a rounded cake of ice and a piece of driftwood. Then the creature could be heaved up. Heaving, cutting with the long, bone, flint-edged knives, feasting on the blackskin—all went merrily together. If the edge of the ice were very rough and uneven a somewhat different method would be employed; the whale would be rolled alongside the ice and rolling and cutting be substituted for heaving and cutting. After the mess was cleared up and the meat, blubber and blackskin equally divided and each had taken his share of the bone, used principally for lashings and at times for sleds, they sent ashore for the dog teams and sleds and women. These dressed the meat and blubber on shore ready for the winter; the blubber for lamps, the meat chiefly for dog-feed; for the natives themselves used to live almost entirely upon seal and caribou, at that time very plentiful and easily hunted.

His inauguration as a boat-leader and the celebration of his first catch, was the most interesting time in a young Eskimo's life. He

paid his initiation fee in whatever he had killed—whale, seal, walrus, deer, whatever it might be. It was no less a happy time for the bucks and squaws of the village, privileged to try to outrival one another in hacking and cutting for the biggest share.[2]

It has been their invariable custom among these believers in magic to carry in their boats many charms to scare away evil spirits. The charm might consist of a small wooden mask or ivory figure, a slab of bone from the last whale or a little piece of stone; the variety was considerable. To the headman of the canoe fell the privilege of cutting out the extreme tip of the whale's spinal column, a small piece of gristle that hardened on exposure to the air. This prize was added to the owner's collection and formed an important adornment for the winter dances, for the greater the number of small bones the higher the social standing of their wearer. The end of the whaling was celebrated by a final grand dance and *nallakulak*, a "tossing in the blanket," a split walrus hide constituting the blanket. Then came the great trading, when the interior natives made journeys to the coast for the occasion. Some went to the Colville River and others as far east as Herschel Island on trading and plundering expeditions.

The advent of the white man to engage in beach or floe whaling was a momentous event for the native of northern Alaska: it was the beginning of the end of his devil business and the old prehistoric style of whaling. The first attempts made at Point Barrow in 1884 had no result, but two years later, under the Pacific Steam Whaling Co. a successful footing was gained and the Eskimos began to adopt the white man's guns and bombs and to acquire a taste for the luxuries of civilization. Trading stations were established and their proprietors made from 500 to 1,000 per cent. profit. In 1890 whaling took a boom. An old prospector and whaleman from Point Hope took charge of the Pacific Steam Whaling Co. station at Point Barrow and brought thither half of the Point Hope village to whale for him. But the expenses of the station amounted to from $15,000

[2] "On the whole the Eskimos are the most cheerful and contented people I have ever come into contact with... I have heard that starvation sometimes visits the districts about Hudson Bay and the eastern Eskimo districts generally, but along the coast known to me starvation has not occurred in recent times though it is known in the interior. Near the Mackenzie mouth there has certainly been no famine during the last 75 years. There is every reason to consider a winter spent by the writer (1906-1907) in an Eskimo family near the Mackenzie delta typical of winters there in general. We had plenty of food for men and dogs; that the food was healthful was pretty well shown in that I gained in weight 20 pounds during the winter; the food was palatable, for after I got used to it I had a good appetite for every meal." (From "Misconceptions About Life in the Arctic" by V. Stefansson, *Bull. Amer. Geogr. Soc.*, Vol. 45, 1913, pp. 23-24).

FIG. 9—Fall whaling: Hauling a bowhead on the beach, preliminary to cutting in; cutting off blubber to lighten whale. Pt. Barrow, Oct. 15, 1911. (This was an unusual year. Most years the cutting-in could be more easily done by hauling the whale up on drift ice held fast by young shore ice.)

FIG. 10—Removing blubber to facilitate the cutting off of the "bone"-bearing upper jaw. Other Eskimos are cutting on the rear portions of the whale for food. Pt. Barrow, Oct. 15, 1911.

to $20,000 a year, for the natives required to be supplied with food, clothes, rifles and ammunition, exactly as good or even better than the white man's; and in 1896 the company was compelled to close down.

Adoption of White Methods by the Natives. The changes introduced by the white man were profound. The Eskimo has almost completely adopted his methods and materials; even the native boat —the only practical kind of boat for floe whaling—has been modified by the substitution of a rounded for the original straight stanchion. It was a long time, however, before the young Eskimo was permitted by the medicine man to use the white man's guns and gear for this first heading of a boat; indeed he was not allowed to use them for several years after the old natives had had them. Before the advent of the white man, cooking on the ice was strictly tabooed, though it must not be concluded that the native lived exclusively on raw meat during the spring whaling for every day some of the wives would bring large tubs of cooked meats to the canoes. Now things are different; whatever the native sees the white man do he must do also. At the present time some of the natives are very progressive. They have some education. The schools and missions have worked wonders, though their teachings have not always helped the Eskimo. Since the natives have accepted the white man's God and have been converted, some of them will not catch a whale on Sunday even though the sea be full and their houses empty and the people on the beach hungry. With others, who have also been converted, it makes no difference. They will whale at any time or place.

Fall whaling, which aims at catching the whales on their return south from the northern breeding grounds, was first tried at Point Barrow in 1907. It occupies about 20 boats, 8 owned by the station, the remainder by the natives. About the middle of September the boats load up with provisions and gear sufficient for a 4 or 5 weeks' camp. They go to Point Barrow, or rather to the extremity of the point; there, if conditions are favorable, they may get a whale or two. At the first sign of daybreak the boats leave the beach and go off shore to the pack, taking a small lunch with them. The pack may be twenty miles off and when the wind is strong and from the northeast the day is likely to be an interesting one: thermometer way below freezing, wind between 20 to 30 miles an hour and spray freezing as it falls. Yet fall whaling has its fascinations; running up and down and in and out among the ice floes; getting a shot at a bear, a seal or walrus or maybe an oogruk; always on the look-out

and every moment expecting to raise a whale; sometimes seeing whole schools of them, but unable to get near them because of the young ice, for if the wind veers round to the northwest and snow falls, nothing can be done. The snow fills up all the lanes of water with slush that quickly freezes hard enough to stop boats and canoes. Then one can only go ashore; the whaling is over for that season.

But the whaling industry is almost a thing of the past. The present market and the price of bone for either white man or Eskimo and the closed season on fur have sealed the fate of the Arctic whaler.

PRINCE WILLIAM SOUND: THE GATEWAY TO THE INTERIOR OF ALASKA[1]

If we look at a map of the Pacific Ocean we will find that nowhere do its open waters extend as far northward as where they strike the southern coast of Alaska. Here they penetrate into the land mass of the continent in an open, crescent-shaped gulf—the Gulf of Alaska. At its head lies Prince William Sound (map, Fig. 1). From the seaward side Prince William Sound therefore has every advantage of location as the gateway into the interior of Alaska. But from the landward side its position is less favorable. Immediately back of it lie the Chugach Mountains with peaks 8,000 to 10,000 ft. high, and farther back of it the Alaska Range interposes its lofty wall, the sweep of whose mighty arc pivots around

[1] Based in part on notes by G. T. Rude of the U. S. Coast and Geodetic Survey, but in the main on the following publications:

A. H. Brooks: Railway Routes in Alaska, *Natl. Geogr. Mag.*, Vol. 18, 1907, pp. 164–190.

A. H. Brooks: The Development of Alaska by Government Railroads, *Quart. Journ. Econ. (Harvard Univ.)*, Vol. 28, 1914, May, pp. 586–596.

Report of Alaska Railroad Commission. With maps, 1:250,000, in separate case. *House Doc. No. 1346, 62nd Congr., 3d Session.* Washington, 1913.

U. S. Grant and D. F. Higgins: Reconnaissance of the Geology and Mineral Resources of Prince William Sound, Alaska. *U. S. Geological Survey Bull. 443.* Washington, 1910.

A. H. Brooks: The Geography and Geology of Alaska. With map of Alaska, 1:2,500,000. *U. S. Geological Survey Professional Paper 45.* Washington, 1906.

A. H. Brooks: The Mount McKinley Region, Alaska. *U. S. Geological Survey Professional Paper 70.* Washington, 1911.

Map of Alaska, 1:5,000,000 (reduction of map accompanying *U. S. G. S. Prof. Paper 70.*) Pl. 1, *Petermanns Mitteilungen*, Vol. 53, 1907.

Map of Alaska by the Alaska Road Commission. 1:1,250,000. Washington, 1913.

Chart of Prince William Sound. 1:200,000. U. S. Coast and Geodetic Survey Chart No. 8550. Washington, 1913.

Prince William Sound as a center as if to cut it off completely from the interior.

These barriers would indeed isolate it effectually, were it not for the fact that rivers have worn their way across them. These natural depressions have predetermined the location of two main routes into the interior, one via the Copper and Delta Rivers, the other via the Susitna and Nenana.

In the case of the Copper-Delta route a river cuts its way entirely across each of the barriers. The Copper River, in one of its branches, rises at the southern edge of the Alaska Range and, flowing south, breaks through the Chugach Mountains, reaching the sea immediately to the east of Prince William Sound. Almost interlocking at its source with the headwaters of the Copper River, the Delta River flows north across the entire width of the Alaska Range to the Tanana lowland beyond. This route is followed by a wagon road and a military telegraph line and, in its southern portion, by a railroad line. Both the wagon road and the railroad do not start, however, from the mouth of the Copper River but from Prince William Sound, because of the protected harbors which its deep fiords supply. The wagon road, which was built and is maintained by the U. S. Army, starts from Valdez in the northeastern extremity of the sound, leads directly across the Chugach Mountains by way of Thomson Pass (2,750 ft.), and reaches the Copper River at Copper Center. The railroad strikes east from its terminus Cordova on the eastern side of the sound and skirts the coastal margin of the mountains for 40 miles before reaching the Copper River. This it then ascends to Chitina, its present terminus on the direct route into the interior, 132 miles from Cordova. The extension of this line to Fairbanks on the Tanana, the metropolis of central Alaska—a distance of 313 miles—was recommended by the Alaska Railroad Commission of 1913, but since the recent selection of the Susitna-Nenana route, referred to below, no such plan is under contemplation.

The Susitna-Nenana route is the one most favored by nature in that it has the least extent of mountain barrier to cross. In its southern part it follows the Susitna lowland, a broad depression, drained by the Susitna River, which forms the northern end of a great trough—here above sea-level, and to the south submerged (Cook Inlet and Shelikof Strait)—enclosed between the Aleutian-Alaskan and the Kenai-Kodiak mountain axes. The Susitna lowland penetrates to the very foot of the Alaska Range; the range

itself is here crossed by an unusually low pass (Broad Pass, 2,500 ft.), which leads over to the Nenana River and thus into the Tanana lowland. The only drawback which this route affords is the fact

FIG. 1—Sketch map of the hinterland of Prince William Sound showing the two main routes into the interior of Alaska: (a) via the Copper and Delta Rivers, and (b) via the Susitna and Nenana Rivers (the Nenana River is the river, nameless on the map, which flows north from Broad Pass into the Tanana). Scale, 1:6,475,000.

that the upper end of Cook Inlet is closed to navigation by ice for four to five months during the winter (November to April). In order to have uninterrupted access the year round to this route its

starting point must be an ice-free port. Such is Seward, at the head of Resurrection Bay, an inlet on the southeastern coast of Kenai Peninsula, whose site was therefore selected as the terminus of the railroad constructed over ten years ago. This line runs north from Seward across the neck of Kenai Peninsula until it reaches Turnagain Arm, an arm of Cook Inlet, at Kern Creek Station, 72 miles from Seward. The original plan was to tap the important Matanuska coal field, keeping in view a possible extension to Fairbanks in the interior.

In August, 1912, provision was made by law for a commission to investigate railroad routes in Alaska. The report[2] submitted early in 1913 by this body, known as the Alaska Railroad Commission, was given serious consideration by Congress and led to the enactment, on March 12, 1914, of a law[3] authorizing the construction of a railroad from the Pacific seaboard to navigable waters in the interior. It was left to the President to select the route, and he chose the route along the Susitna and Nenana Rivers, to connect Seward with Fairbanks. In May, a new commission, known as the Alaskan Engineering Commission, was appointed to carry out the provisions of the act. Detailed surveys for the definite location of the line were immediately begun. The existing 72-mile stretch from Seward to Turnagain Arm was purchased by the government. The remaining portion to be constructed, from Turnagain Arm to Fairbanks, would be 391 miles long according to the estimate of the Alaska Railroad Commission. Construction inland is under way from Anchorage, a new town on Knik Arm, the other of the two inlets at the head of Cook Inlet.

While Seward seems the logical terminus for the government railroad, in view of its existing railroad connection, it may be worth while to point out that there is an alternative route of access to the Susitna-Nenana line which could make it directly tributary to Prince William Sound. At its base, Kenai Peninsula is narrowed down to a neck of land only ten miles wide between Turnagain Arm, on the Cook Inlet side, and Passage Canal, an inlet of Prince William Sound. Recent surveys by the U. S. Geological Survey[4] and the U. S. Coast and Geodetic Survey[5] show that this would prove a feasible route for a railroad. For six miles at the western end and one mile at the eastern end the route consists of an open

[2] See footnote 1, third item.
[3] Text reproduced in *U. S. Geol. Survey Bull. 592*, pp. 48–50.
[4] *U. S. Geol. Survey Bull. 592*, pp. 50–52, with map, 1:62,500 (Pl. II).
[5] Chart No. 8550, edition of May, 1915.

valley. The intervening three miles are blocked by a glacier and a ridge. A two-mile tunnel and a second tunnel or rock cut half a mile in length would overcome these difficulties. The soundings in Passage Canal show that it is a deep fiord suited to shipping similar to the other arms of Prince William Sound. This shorter route to tidewater would have the advantage of eliminating the somewhat heavy grades encountered between Seward and Turnagain Arm (there are two summits, 700 feet and 1,065 feet high respectively).

The economic resources for which these routes provide an outlet are among the most important of the Territory. About 30 miles east of the mouth of the Copper River and a short distance inland lies the Bering River coal field, one of the two Alaska coal fields containing the largest amount of high-grade coal. The surveyed parts of the field embrace about 22 square miles underlain by anthracite and about 28 square miles underlain by semi-bituminous and semi-anthracite coal. Most of this is as yet untouched, awaiting only proper transportation facilities. Outlet by way of the adjacent sea is rendered difficult by the unprotected nature or shallowness of the only available harbors, Katalla and Controller Bay, and the Alaska Railroad Commission has therefore recommended the construction of a branch from the Copper River railroad to tap this important area. This branch would also serve the petroleum oil fields opened up a few years ago near Katalla.

About 100 miles above its mouth, the Copper River receives from the east a large tributary, the Chitina. Its valley is the site of an important belt of copper ore, over 100 miles long and 5 to 10 miles wide. Since 1911 this region has been made accessible by a railroad branching off from the main line at Chitina and ascending the valley for 64 miles to Kennicott (Fig. 5). Here is located the Bonanza Mine which is producing and shipping $1,000,000 worth of copper per month. Immediately adjoining is the Nizina gold placer district. By extending this branch line to the east over Skolai Pass another copper-bearing area of much importance could be tapped at the head of the White River.

On reaching the Tanana the Copper-Delta River route enters into one of the important agricultural areas of the Territory. In the Tanana Valley below the Delta River there are, according to a recent estimate,[6] 4,500,000 acres of tillable land, of which only several hundred are at present under cultivation. While the grow-

[6] H. H Bennett and T. D. Rice: Soil Reconnoissance in Alaska, with Estimate of Agricultural Possibilities (202 pp.; maps, ills.), from *Field Operations of the Bureau of Soils, 1914*, Washington, 1915, p. 184.

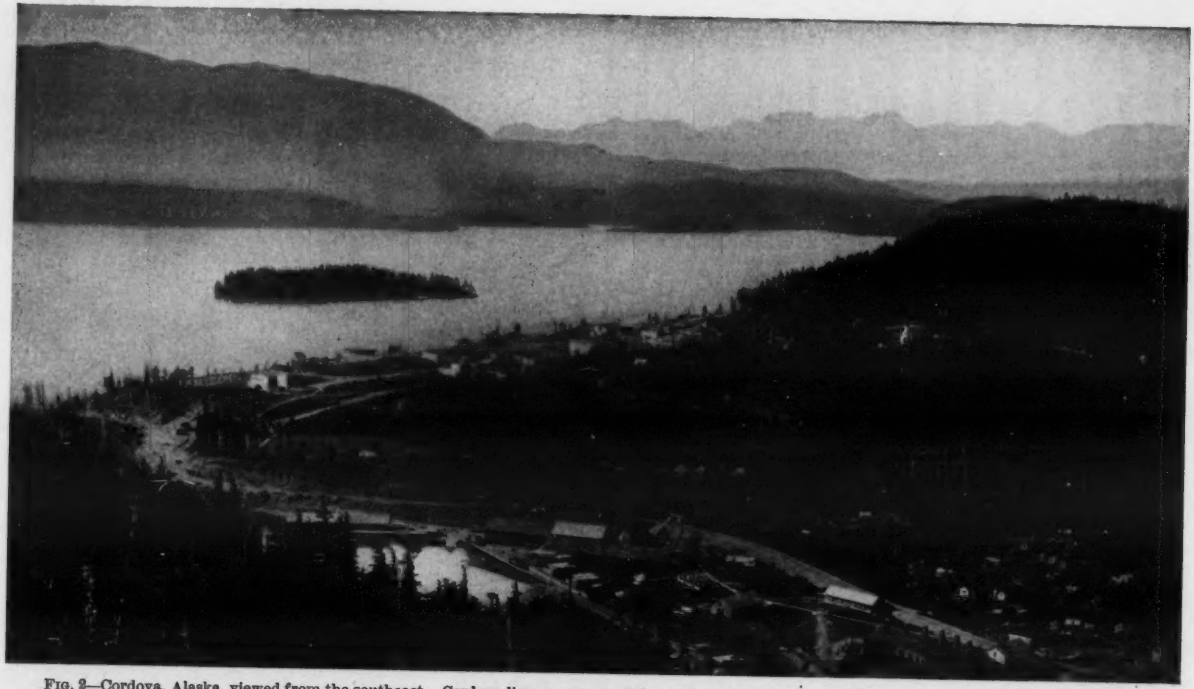

FIG. 2—Cordova, Alaska, viewed from the southeast. Cordova lies on a narrow inlet enclosed between the mainland and Hawkins Island, the bold ridge in the middle background. The town lies at a point where a transverse gap through the range at its back reaches the inlet. This depression, seen in the foreground, is followed by the Copper River railroad. The open sea lies only 15 miles away, by following the inlet to the left, as seen in the view; but as this is shallow, the route for shipping turns to the right, around Hawkins Island, and out of Prince William Sound by way of the strait between Montague and Hinchinbrook Islands—a distance of nearly 60 miles (see map, Fig. 6).

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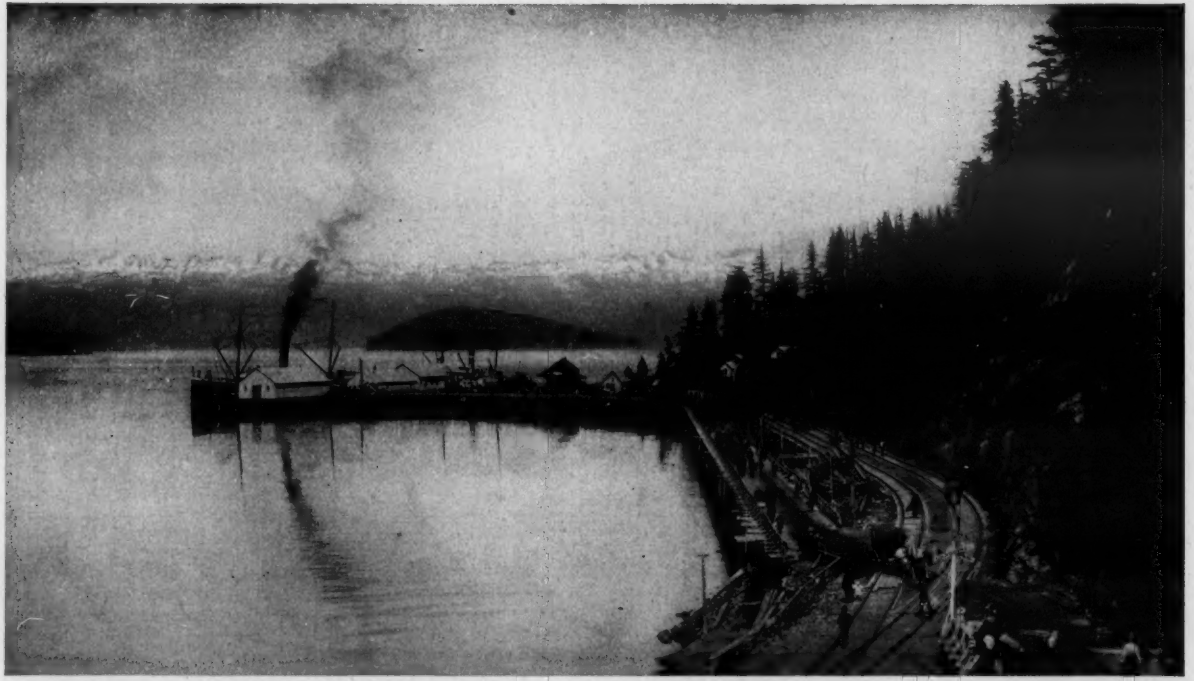

FIG. 3—The Copper River & Northwestern Railway Company's dock at Cordova. This is the point of transshipment for the copper ore from the Kennicott district to the Puget Sound Smelters. Chugach Mountains in the background.

ing season is short (90 to 120 days) the additional length of daylight due to the high latitude acts as a compensating factor. The main products are potatoes and other hardy vegetables, such as cabbage, carrots, beats and turnips, and hay. Although grain is as yet not grown extensively, it is an established fact that it can be matured. While the district can not be expected to raise products for export, at least under conditions which can now be foreseen, it has every prospect of becoming the supply center for the local market. In 1910 it had a population of over 4,000. This is mainly concentrated in the Fairbanks gold district. Since their discovery in 1902 its placers have yielded $153,000,000 worth of gold. The value of the gold output of 1912 was about $4,300,000; of 1914, over $2,700,000.

The resources of the Susitna-Nenana route are no less important. Along the valley which forms the upper continuation of Knik Arm, and extending for about 50 or 60 miles from a point 25 miles above the head of the inlet, lies the Matanuska coal field. This and the Bering River field, referred to above, are the two most important coal-bearing areas of Alaska. In the surveyed part of the field the productive area is estimated to be 74 square miles. The coal varies in quality from a lignite to a bituminous and anthracite coal, with the bituminous predominating. The Matanuska field can best be tapped by a branch from the Seward-Fairbanks railroad, beginning at the head of Knik Arm. Its construction is now under way.

Beyond the Alaska Range, on its outer slope, lies the Nenana coal field. Although it is the largest known field in Alaska (165 square miles) no attempt has been made to mine any of its coal because of lack of transportation facilities. Its coals are all of a lignitic character, but as they lie north of the Alaska Range they could be transported for local use to Fairbanks in competition with the better fuel from the Matanuska field.

In the Susitna lowland the Susitna-Nenana route serves an area which promises to become the foremost agricultural area of Alaska. It is estimated that 2,000 square miles will be available for cultivation. Potatoes and forage crops have already been grown successfully, and the same crops that are raised in the Tanana lowland will flourish here better, if anything, than there because of the longer growing season. The greater part of this area is forested; a large amount of timber will thus become available in clearing the land for cultivation; proper conservation of the remainder will insure an adequate supply to satisfy local demands.

Not only the hinterland of Prince William Sound is of economic

FIG. 4.

FIG. 5.

FIG. 4—First Street, Cordova, Alaska. The mountains in the background are a local southwest-trending spur of the Chugach Mountains, at whose western, seaward foot the town lies. The forested ridge in the background is the same as that seen on the right in Figure 2.

FIG. 5—Kennicott, the center of the Chitina copper mining district. Kennicott is the present terminus of the Copper River & Northwestern Railway. The mountains in the background are part of the Wrangell Mountains.

importance, but the immediate region of the sound as well (map, Fig. 6). The two principal industries are mining and fishing. Copper is the chief mineral, although some gold is also found. In 1913 and 1914 the production of the district was valued at $1,328,000 and $1,200,000 respectively. During 1914 a mine on Latouche Island, in the southwestern part of the sound, produced 4,500 tons of copper ore per month. Latouche Island, Knight Island, adjoining it to the north, and the eastern shores of the sound are the main mineralized areas. The Ellamar district, on the northeastern shore, is the chief copper-producing area. Salmon is the principal fish caught. The

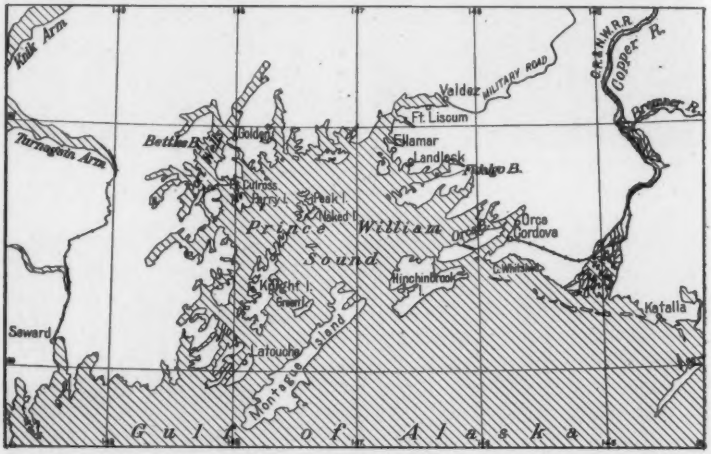

FIG. 6—Sketch map of Prince William Sound, Alaska. Scale, 1:3,333,000.

principal fishing grounds are off the delta of the Copper River. At Orca near Cordova a cannery is operated whose output averages fifty thousand cases a year.

These various industries and trade opportunities have led to the concentration of a considerable population along the shores of the sound. The two principal towns are Cordova and Valdez. Cordova had a population of about 1,200 in 1910, Valdez, including the military reservation adjacent to the town, of about 1,500. Both towns are provided with hotels, stores, a bank, schools, churches, telephone and electric light systems, daily newspapers and a fire department, and show every evidence of enterprise and growth (Fig. 4). Other settlements are Orca, near Cordova, Land Lock and Ellamar on the

eastern side of the sound. Seward, the terminus of the Susitna-Nenana route to the west, had a population of over 500 in 1910.

Its importance as the gateway to the interior has given Prince William Sound excellent connections with the outside world. Most of its commerce is with Puget Sound, although there is some traffic with San Francisco. The cable as well as the regular steamship lines connect with Seattle. Of the two companies operating steamship service, one despatches a steamer every six days from Seattle, the other about three times a month. The steamers in the service average 300 feet in length and 3,000 tons gross tonnage. The distance from Cordova to Seattle is 1,400 statute miles and is covered in five days. The natural configuration of the sound (map, Fig. 6) makes it an ideal haven for shipping. Representing, as it does, the southern slope of the Chugach Mountains into which the sea has penetrated, its shore line is made up of a great number of fiords and inlets whose deep water and sheltered position afford excellent harbor sites. Both Valdez and Cordova are thus situated: Valdez at the head of a fiord, Cordova on the shore of an inlet protected by an island lying in front of it (Figs. 2 and 3).

Such, in brief, is the present geographical condition of the Prince William Sound region. Its future possibilities are apparent, and there is no doubt that the new era of railroad construction will contribute materially to the realization of their full development.

SEWARD, THE TERMINUS OF ALASKA'S NEW RAILROAD*

The selection of the Susitna-Nenana route for the railroad to be constructed by the government opens a new era in the development of Seward. The economic significance of this route, of which Seward is the outlet, has been dwelt upon in the preceding article. A few words with regard to the town itself and the resources of its immediate surroundings may therefore not be out of place.

Seward lies at the head of Resurrection Bay, one of the deep bays characteristic of the southeastern coast of Kenai Peninsula. The town occupies a bench on the western side of the bay at the foot of

* Based on notes by E. Lester Jones, Superintendent of the U. S. Coast and Geodetic Survey, the Report of the Alaska Railroad Commission (*House Doc. No. 1346, 62nd Congr., 3d Session*, Washington, 1913), and "Geology and Mineral Resources of Kenai Peninsula" by G. C. Martin and others, *U. S. Geol. Surv. Bull. 587*, Washington, 1915.

steep hills. It is provided with all necessary conveniences, having a good water supply from a small stream in the hills and an electric plant whose hydraulic power is similarly derived. There is ample room for expansion to the north along the timbered plain which forms the upper continuation of the bay, and the mud flats at its head offer opportunity for easy reclamation for commercial purposes. Depths throughout the bay are great (100 to 200 fathoms); the lack of anchorage facilities which this involves, is, indeed, the only objectionable feature of the harbor. There is, however, a satisfactory anchorage area half a square mile in extent at Sunny Cove on the west side of Renard Island, just inside the entrance to Resurrection Bay. The bay is always free from ice—it is this, together with the existence of a natural depression leading to Cook Inlet, which has made it the logical outlet of the Susitna-Nenana route, as the natural outlet of this route, Cook Inlet, is closed in its upper part by ice during the winter. The railroad from Turnagain Arm runs through the town close to the shore of the bay and terminates in a dock which extends out to 25 feet of water at low tide.

Seward's connections with Puget Sound are at present maintained by two steamship lines, two steamers a week arriving during the summer of 1913. The distance from Seattle to Seward is 1,420 statute miles. The greater accessibility which the completion of the railroad will bring about for Fairbanks, and the interior of Alaska in general, is well illustrated by the following comparison with the new route of the time consumed on the three routes used at present.

Two weeks at least, and usually three, are required for the 2,670-mile trip via White Pass and the Upper Yukon. Twenty to twenty-four days are needed for the 3,800-mile all-water route via St. Michaels and up the lower Yukon. The 1,845-mile trip via Cordova (Cordova to Chitina, by railroad; Chitina to Fairbanks, by stage or sled) takes at least fifteen days. Via the Seward-Fairbanks railroad the 1,883-mile trip from Seattle will take only six days.

In its immediate surroundings Seward also possesses a valuable asset. It is the key to the Kenai Peninsula, an area of considerable natural resources. These are governed by the topography of the peninsula, which divide it into two distinct districts, a rugged mountainous area in the east and a gently sloping lowland in the west. The streams in the mountainous section, with their steep gradient and waterfalls, afford abundant water-power for local use. It is already utilized in gold mining, the most important industry of the peninsula, which is restricted to the mountain district. The

FIG. 1.

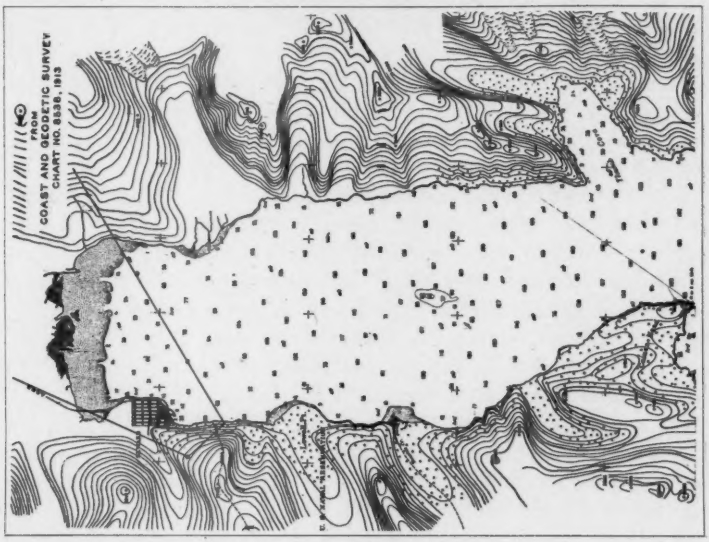

FIG. 2.

FIG. 1—View of Seward, Alaska.

FIG. 2—Map of the head of Resurrection Bay, showing the location of Seward (reproduced from U. S. Coast and Geodetic Survey Chart No. 8538). Scale, 1:160,000. The diverging lines include the area shown on Fig. 1, which was taken from the point approximately indicated by the small circle.

valleys are heavily timbered up to elevations of 1,200 to 1,500 feet above sea-level, spruce being the most plentiful variety and the most valuable for commercial uses. In the lowland the characteristic vegetation is light, scattered timber with open, grassy meadows. Native hay is available for forage. Vegetables are raised for local consumption at Seward and other favorable points. Game is abundant. Indeed, Kenai Peninsula has been described as one of the few big-game countries combining accessibility and abundance of forms. The chief examples are moose, mountain sheep and black and brown bears. The streams and lakes in the mountainous eastern half teem with trout. Salmon is caught on the Cook Inlet side, where a number of canneries have been established.

RAILROADS IN TURKEY

(With map facing p. 936.)

The broad Eurasian landmass contains three densely populated areas. Of these Central Europe is the westernmost. The Indian Peninsula follows, situated approximately midway between the European area and the coast-lands and islands of eastern Asia, which form the easternmost of the three. In these three regions only does the average density of population exceed 64 inhabitants to the square mile. The speediest and most convenient routes between the westernmost and the two Asiatic regions must inevitably cross Turkey. This feature, together with the fact that Asiatic Turkey is a land richly endowed with natural resources and that, although lying at Europe's very door, it is still undeveloped, confer upon Turkish railroads an importance which has always been keenly realized by enterprising business men the world over.

All travel between Europe and Asia is deflected into northern and southern channels by a central mass of mountains which separate a vast lowland of plains and steppes on the north from the table-lands of southern Asia. Age-old avenues of human migration and of trade in the northern area have the disadvantage of traversing sparsely inhabited regions. To build transcontinental railroads along this route implies scaling some of the highest mountain ranges in the world in order to tap the populous centers of India. Although the feat is not beyond the engineer's ability, it cannot be taken into consideration by the capitalists who supply construc-

tion funds. Southern routes, on the other hand, link with the seas that set far inland on Asiatic coasts. The function of the Turkish trunk lines is to provide the shortest connection between European railways and the steel tracks of southern Asia or to connect with the sea routes that link harbor to harbor from the Persian Gulf to the China Sea.

Once completed, the Turkish lines will provide land connection between Europe on the one hand and Asia, as well as Africa, on the other. Barring a short mile of water at the Bosporus, the track will be continuous from the shores of the North Sea to the coast of the Persian Gulf. The construction of a bridge across the Bosporus would make it possible to haul the same car from the one sea to the other. The Turkish railroads will also link European systems with the Cape-to-Cairo line. Unbroken rail connection between any European point and the Cape of Good Hope, via Constantinople, Aleppo and Cairo, will thus be possible.

Since Turkey is the seat of through routes, its railroads play a great part in international transportation. Hence it is that the Turkish lines, with the exception of the Hejaz railroad, have been controlled by financiers grouped according to nationality. At present the majority of shareholders in each of the concessions belong to one or the other of the great European powers.

Englishmen were the first to engage in Turkish railway building. The Aidin railroad, which links the thriving port of Smyrna to the Anatolian plateau at Dineir, represents an investment of about $50,000,000, or about a third of the money invested in Turkey by the British public. Its construction began in 1856. This road taps the fertile Meander valley and has proved a remunerative undertaking to its owners, although it has not been subsidized by the Turkish government. The line is credited with the best management in Turkey. Its well-ballasted track and the splendid condition of its rolling stock impress the traveler most favorably. English capital is also represented in the other lines built in Turkey, though only as minority holdings.

Italy's connection with Turkish railroads has consisted in providing labor and in laying claim to franchises in southern Asia Minor. Specifically the Italian demands cover the sole right of building lines inland from the Gulf of Adalia and of connecting them with the British and German roads on the north and east. These claims are of recent date, and have been put forth since the occupation of the islands of the Dodecanesia by Italian troops.

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The most important road in Turkey is the partially completed trunk line running diagonally across Asia Minor and beyond into Mesopotamia. The line is German-owned, although French and English capital is represented among its shareholders. The concession for the first stretch, extending from Constantinople to Konia, had been granted to German and Austrian railroad builders in 1888. The celebrated Bagdad railroad is the prolongation of this line. Its construction was turned over to German promoters by a *firman* (decree) dated January 21, 1902. The financial burden of the enterprise was estimated at about $200,000,000.

Starting from Konia the line was prolonged in a southeasterly direction to connect with the Mersina-Adana railway. From the Cilician plain the track crosses the northern portion of the Syrian desert, whence, striking south, it invades the fertile lowlands of Mesopotamia. Its terminus will be a port on the Persian Gulf. Between Konia and Bagdad the only heavy work of construction is encountered in the crossing of the lofty Cilician Taurus and Amanus ranges. In both cases it was necessary to drive tunnels. The Amanus tunnel was completed this summer[1] and it is expected that the Taurus underground section will be open to traffic in 1916.[2]

By acquiring mastery over this trunk line the Germans had succeeded in taking a first mortgage on Turkey. It was the first signal success of the policy of directing Teutonic ambitions into Eastern channels which Bismarck had adopted immediately after the consolidation of the German Empire. His foresight beheld the vision of an all-German line of traffic starting at Hamburg and crossing the Bosporus towards the Far East. In one direction German calculations miscarried. Germany was unable to finance the undertaking without the support of British and French capitalists. The international character of the line became more and more pronounced between the years 1908 and 1911. During this period a number of agreements were signed between Great Britain, France, Germany and Turkey in which a notable percentage of German interests passed over to the two rival countries, the Germans emerging out of the transaction with a bare majority.

The project of an all-German route received another set-back by the award to England of the final section of the Bagdad line. This successful stroke of British diplomacy consolidated British

[1] C. Rabot: État d'avancement du chemin de fer de Bagdad, *La Géogr.*, Vol. 30, 1915, No. 4, pp. 286–288.

[2] S. F. Newcombe and J. P. S. Greig: The Baghdad Railway, *Geogr. Journ.*, Vol. 46, 1914, No. 6, p. 587.

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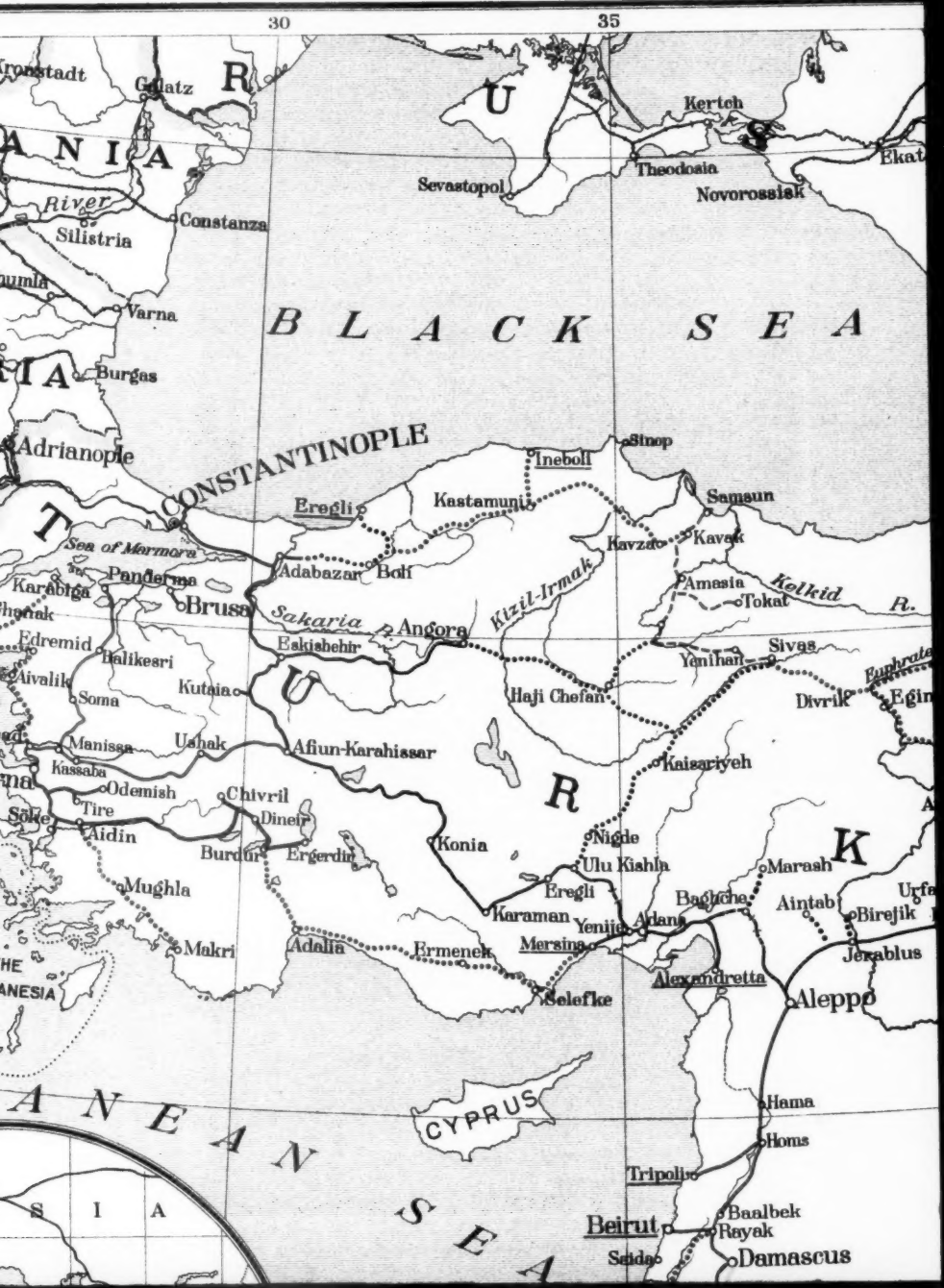
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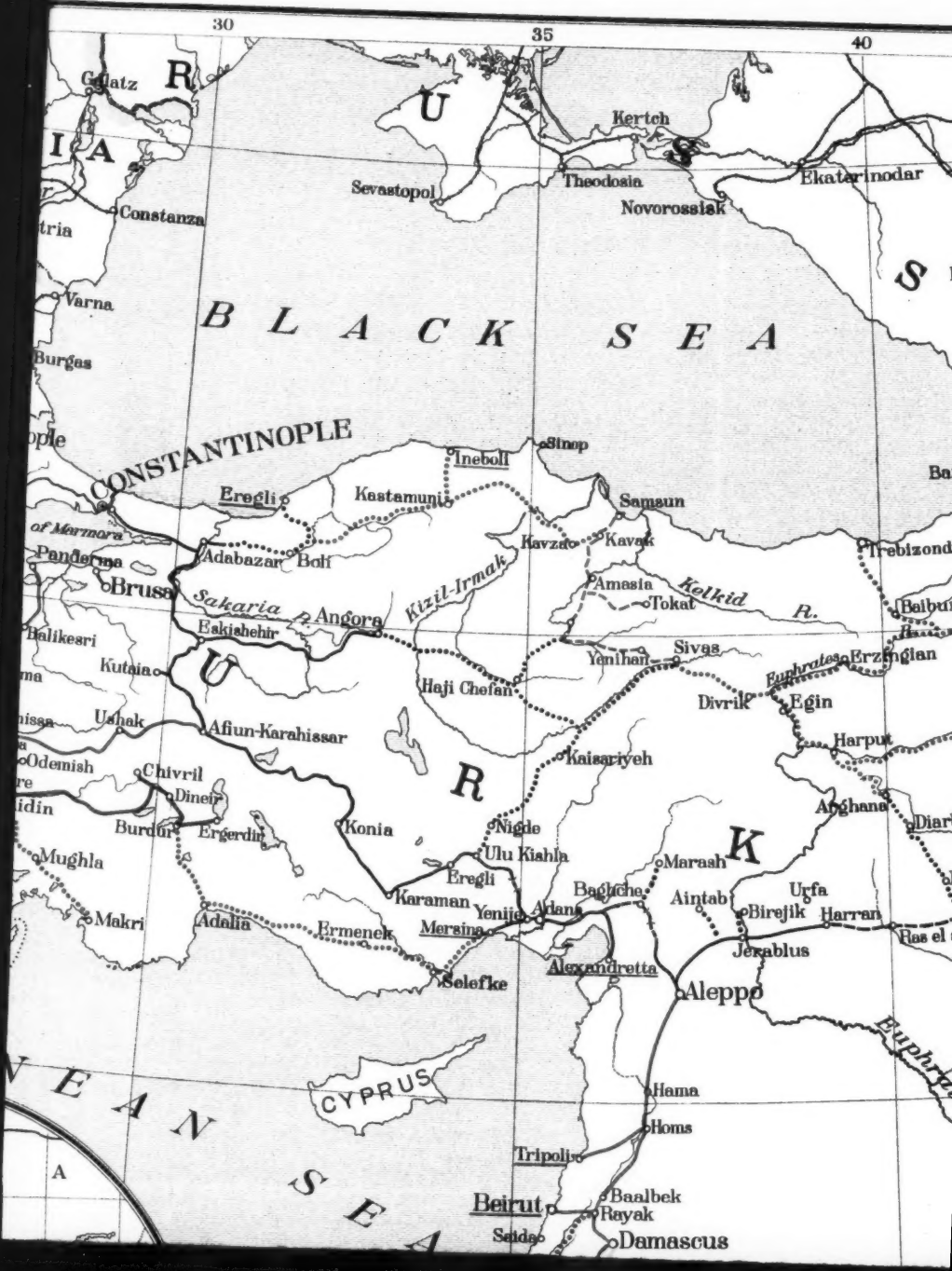
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Burdur
Ergerdir
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Ulu Kishla
Marash
Mughla
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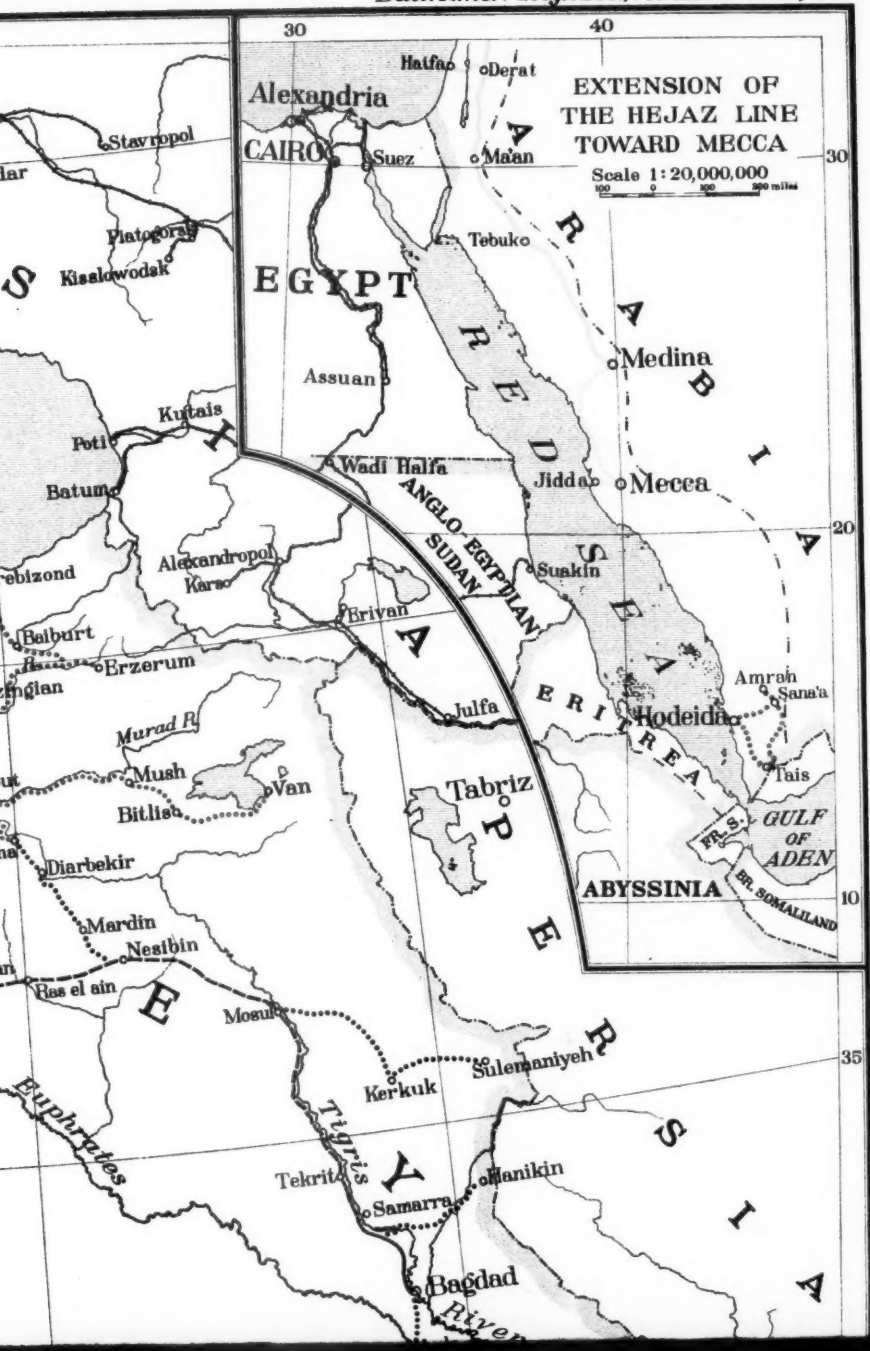
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ANGLO-EGYPTIAN SUDAN
Suakin
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Tekrit
Samarra
Hanikin
Bagdad
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Piatogorsk
Kisslowodsk

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Monastir
Philippopolis
BULGARIA
Burgas
Adrianople
CONSTANT
Salonica
Dedeagatch
Sea of Marmora
Corfu
Malakasi
Larissa
Karabiga
Pandermo
Brusa
Chemak
Esme
Edremid
Balikesri
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Aivalik
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GREAT BRITAIN
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AFGHAN.
BALUCH
LIBYA
EGYPT
ARABIA
INDIA
ATLANTIC OCEAN
ARABIAN SEA
BAY OF BENGAL
ABYSSINIA
THE CENTRAL POSITION OF TURKEY WITH REFERENCE TO INTERCONTINENTAL TRAFFIC
Equatorial Scale 1:94,000,000
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40
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0
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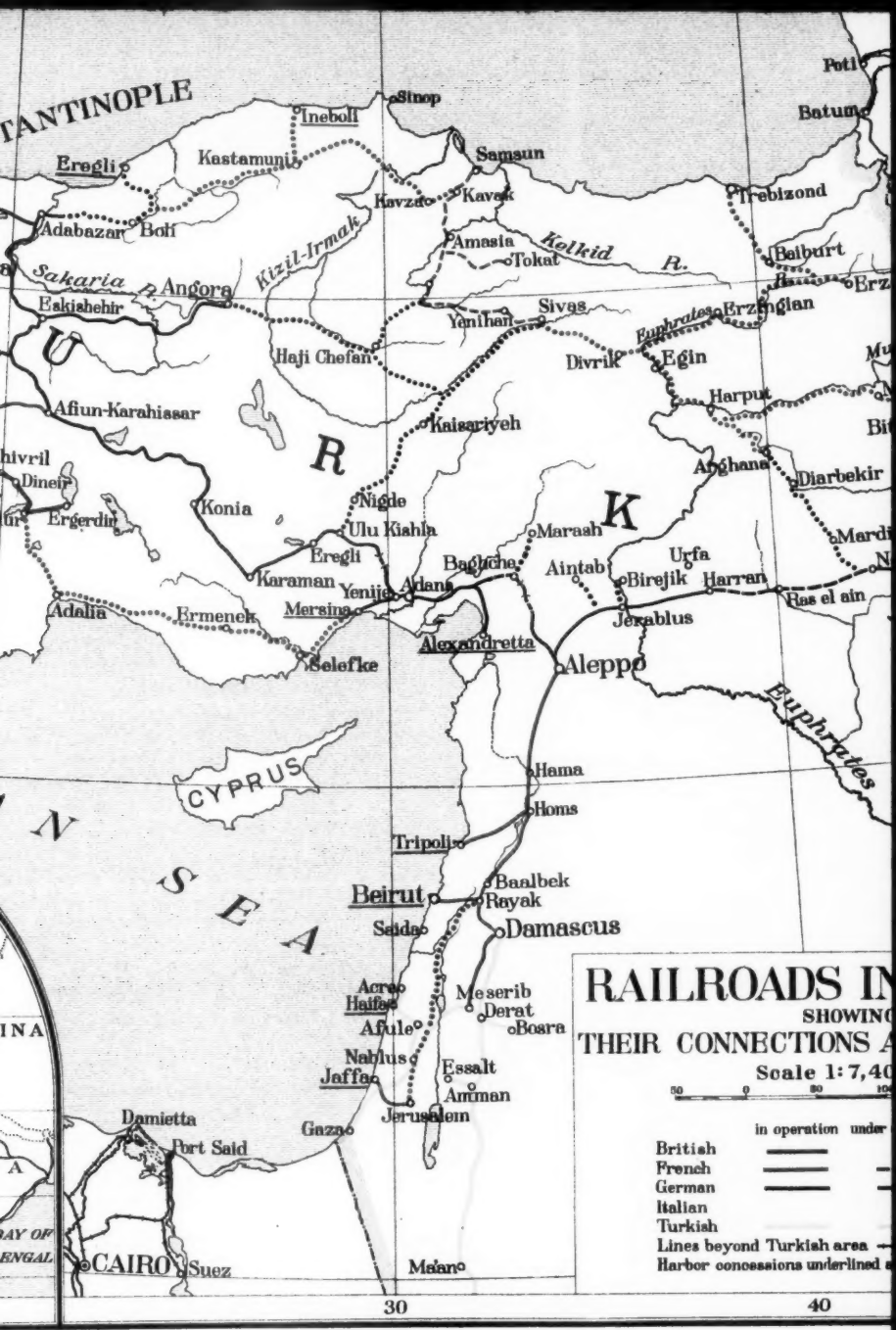
XUM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Tokat
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Angora
Kizil-Irmak
Eskishehir
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Sivas
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Harput
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Ergerdir
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Karaman
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Birejik
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Yenija
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Ras el ain
Alexandretta
Aleppo
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Euphrates
CYPRUS
Hama
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Tripoli
Baalbek
Beirut
Rayak
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Damascus
Acre
Haifa
Meserib
Derat
Afule
Bosra
Nablus
Essalt
Jaffa
Amman
Jerusalem
Damietta
Gaza
Port Said
CAIRO
Suez
Maan
RAILROADS IN
SHOWING
THEIR CONNECTIONS A
Scale 1:7,40
in operation under
British
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Lines beyond Turkish area
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30
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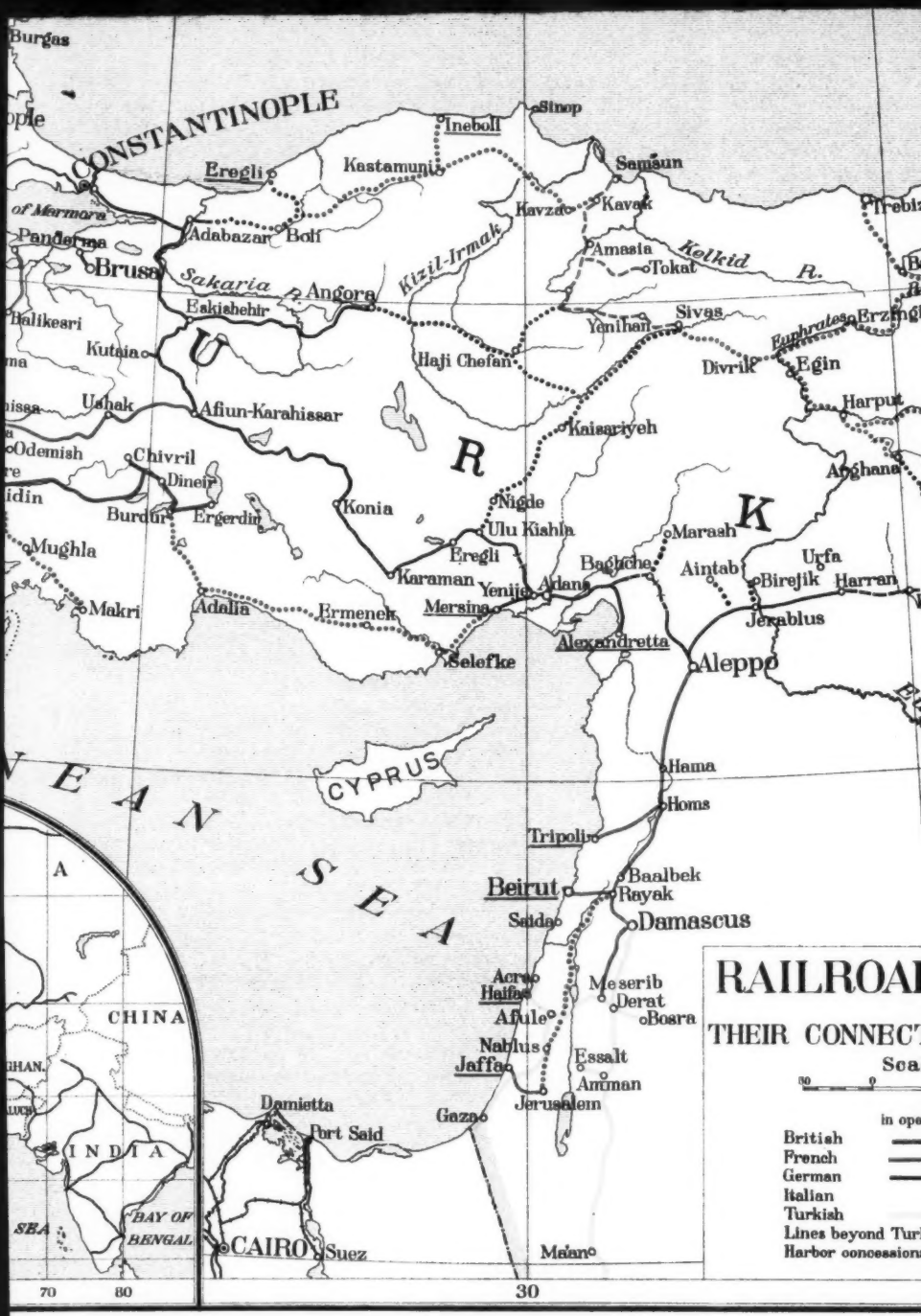
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Lines beyond Tur
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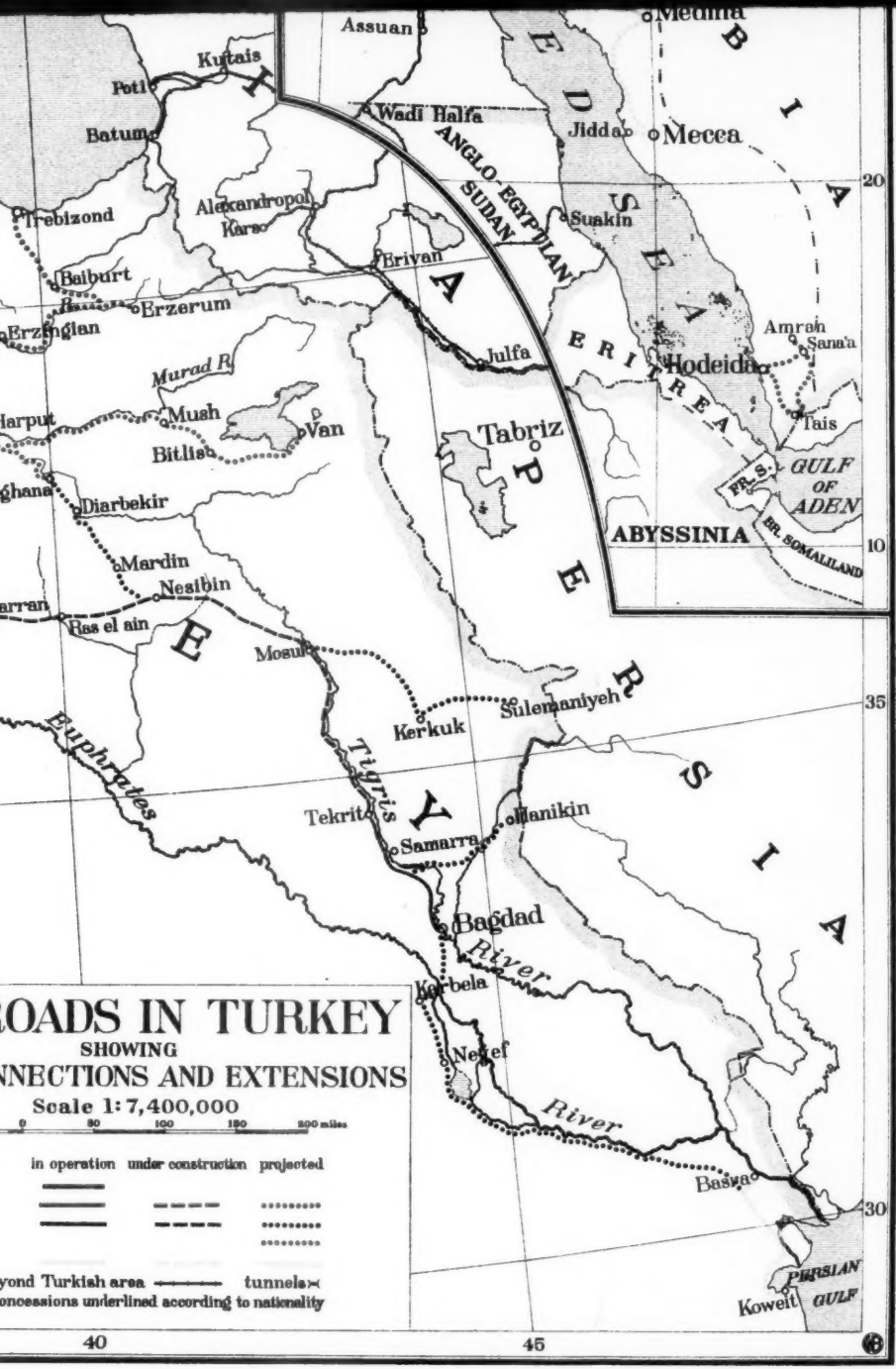
Assuan
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Batum
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Mecca
ANGLO-EGYPTIAN SUDAN
Trebizond
Alexandropol
Kars
Suakin
Erivan
Baiburt
Erzerum
Erzingian
Murad R.
Julfa
Amran
Sana'a
Hodeida
Mush
Van
Tabriz
Tais
Bitlis
FR. S.
GULF OF ADEN
Diarbekir
ABYSSINIA
BR. SOMALILAND
Mardin
Nesibin
Ras el ain
Mosul
Sulemaniyeh
Kerkuk
Euphrates
Tigris
Tekrit
Samarra
Hanikin
Bagdad
River
Kerbela
Nejef
River
Basra
PERSIAN GULF
Koweit
ERITREA
PERSIA
ARABIA
ROADS IN TURKEY
SHOWING
CONNECTIONS AND EXTENSIONS
Scale 1: 7,400,000
0 50 100 150 200 miles
in operation
under construction
projected
beyond Turkish area
tunnels
concessions underlined according to nationality
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influence in the Persian Gulf. Koweit and the environing districts ruled by petty Arabian chiefs became British protectorates and the long-planned German through-line merely butted against a solid wall raised by British ability.

The French have invested twice as much capital as the English in Turkish railroads. The lines they manage and own directly are the Syrian railroads and the Smyrna-Kassaba line. They are also interested in the construction of roads in the northeastern districts of the country where concessions have been awarded to Russians. Muscovite inability to provide capital is responsible for the transfer of the building and operating grants to Frenchmen.

French builders first undertook to connect the province of Lebanon with the sea by constructing the Beirut-Damascus line. The tracks were subsequently extended to Aleppo, a city whose greatness was founded on its situation along the natural road which connects the Mediterranean with the Persian Gulf. As a railroad center Aleppo's future looms bright, for the city lies also in the path of the tracks which will connect the Black Sea with the Mediterranean.

In southern Syria, the outlook for French enterprise was dimmed for a few years by the construction of a Turkish line from Damascus southwards. Branch lines were carried to the sea. Harbor concessions, however, were granted to French firms. French interests thus retained a notable share of the control over the traffic directed in and out of Syria. Furthermore, a concession for a line from Rayak to connect with the Jaffa-Jerusalem road which they obtained in 1914 will enable them to compete with the Hejaz line.

The last railroad agreement between the French and Turkish government was signed on April 9, 1914. Concessions on the part of the Turkish government are bestowed in return for French financial support. The lines granted will tap northern Anatolia and Armenia. Connection with the German lines will be made at Boli and at Arghana. The area tributary to this line contains fertile plains and plateaus. It is known to be rich in mines, notably in copper. The advent of the engine will undoubtedly brighten the outlook of the Turkish mining industry.

In southern Arabia, a railroad concession had been awarded to French promoters in 1908. The line was to connect the seaport of Hodeida with Sana'a. It was intended to divert into Turkish territory the large trade with the interior which now passes through Aden. Strategic reasons also weighed heavily in the decision to

build this road. At no time have the Arabs of the Yemen shown sympathy for their Turkish rulers. Every commander sent to quell their incessant rebellions ascribed his failure to lack of transportation facilities. It was mainly in view of this condition that steps were taken to connect this section of the Arabian table-land with the sea.

The only line owned by the Turks in their country is the narrow-gauge railway known as the Hejaz line which starts from Damascus and is intended to attain the holy town of Mecca. The financing of this line has been unparalleled in the annals of railroad building. Ostensibly the purpose of the construction was to provide traveling conveniences to the 250,000 pilgrims who, it is estimated, come annually from all parts of the Mohammedan world to worship at the Kaba'a. In the belief of many, the line was built for strategical reasons and to enforce Turkish sovereignty among the Arabs, who have always been loath to admit the Sultan's claims to the caliphate.

The funds for the construction and equipment of the road were obtained by appealing to the religious feelings of the 230,000,000 Mohammedans scattered in widely separated regions of the globe. Stress was laid on the pious character of the undertaking. According to reports, $14,000,000 were collected soon after the enterprise was launched. Thereafter about $12,000,000 were contributed annually for a few years. The operation involved no responsibility to the promoters, headed by Abdul Hamid, the former Sultan of Turkey, all the funds being bestowed in the form of donations. The road has thus no shareholders and no bonded indebtedness, its capital being spontaneously wiped off.

The religious character of the undertaking is apparent in the mosque-wagon attached to each train. Seen from the outside, the prayer carriage is distinguished only by means of a diminutive minaret six and a half feet high. The interior is fitted out according to religious custom with rugs on the floor and framed Koranic verses in letters of gold on the walls. The direction of Mecca is indicated by a map at the end of the car, so as to enable the faithful to orient themselves properly when engaged in prayer.

The war brought fresh impetus to railroad construction in Turkey. Recent accounts describe work on the Bagdad line as being actively pushed. The strategic importance of this trunk route accounts fully for the rush of construction. The success of future expeditions against Egypt depends on its completion. Rail communication between southern Syria and Constantinople is still impeded by the

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unfinished state of road-building in the tunnels which will pierce the Taurus and Amanus ranges. It is not unlikely, however, that trains will be run between the capital and Syrian localities by the middle of 1916. Press reports of the past twelve months have also made occasional reference to the construction of a line starting from the Jaffa-Jerusalem tracks and directed towards Egypt. Farther east, track-laying has proceeded on the section of the line advancing northward from Bagdad to meet the advance east of Aleppo. This portion of the Bagdad railroad coincides with the old caravan routes which skirted the northern edge of the sand areas of the Syrian desert and followed thence the valleys of the Tigris and Euphrates.

A hopeful view of the future of Turkey's economic position may be entertained by remembering that the land is still unexploited and that the resources of its soil and subsoil await the handling of Western energy. It is expected that as fine a cereal crop as can be obtained anywhere in the world will be raised in the region between Eskishehir, Angora and Konia. Five million dollars spent by Germans on irrigation at Chumra in the vicinity of the last-named city has proved conclusively that a thriving agricultural industry can be reared on the interior plateau of Asia Minor. The Cilician plain, where cotton and cereals are cultivated, contains vast tracts of swamp land which can be reclaimed. Here, too, irrigation would greatly improve cotton culture. Many of these rich soils are parts of Turkish crownlands which have been estimated by some as attaining one-tenth of the entire area of Turkey. The lands owned by the Evkaf, or Ministry of Religious Foundations, also cover vast areas. Estates held under either of these forms of tenure can be rendered highly productive under Western management. The southernmost end of the Bagdad line taps rich oil fields which are situated in the area of transition between the plateau of Iran and the Mesopotamian depression. The railroad traverses the western end of this oil basin. Its eastern section in Persia has been developed since 1908 by British firms.

The international control of Turkish railroads reflects the transitional character of the land over which they are built. Ownership in Turkish lines is of practically no value to so backward a people as the Turks have proved themselves to be. It is of vital importance to the industrial communities of the countries which hold the extremities of the roads of which the Turkish system is but a link. Germany, Austria or France at the western extremity of the transcontinental line, Great Britain in India at its eastern end, have

interests which affect a large proportion of their population. In the west the great through-line starts in some of the busiest industrial centers of the world. In the east it taps coveted markets. The attention of European manufacturers is directed towards densely populated India or China simply because people spell trade.

L. D.

KRÜMMEL'S HANDBOOK OF OCEANOGRAPHY: A REVIEW*[1]

By LUDWIG MECKING, Ph.D.
University of Kiel

Modern oceanography dates from the middle of the last century. At that time an American naval officer, M. F. Maury, published the first comprehensive treatise on the "physical geography of the sea" and became the leading spirit in urging investigation of the sea and its phenomena. As a result of his efforts and in consequence of the awakening interest in marine zoology and the requirements of cable laying, numerous deep-sea expeditions were sent forth during the sixties, culminating during the seventies in the cruises of the *Challenger, Gazelle,* and *Tuscarora.* It was the extensive material collected on these trips which was then, in the eighties, scientifically sifted and summarized in a German handbook of oceanography by Boguslawski and Krümmel.

Since then a quarter of a century has passed. In that time the investigation of the sea has developed uninterruptedly. Krümmel himself took an active part in it on the German expedition of the *National.* But during the last quarter of a century, as compared with the preceding twenty-five years, the emphasis lay rather on intensive than extensive research, and rather on investigations of a theoretical than of a practical nature. Methods and instruments, due to the contributions of Nansen, Krümmel, Pettersson and others,

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*Translated from the original, written in German for the *Bulletin.*

[1] O. Krümmel: Handbuch der Ozeanographie. Vol. I: Die räumlichen, chemischen und physikalischen Verhältnisse des Meeres, 1907. (2nd edit. of Vol. I of "Handbuch der Ozeanographie," by G. von Boguslawski, 1884). xvi and 536 pp. Maps, diagrams, and tables. Vol. II: Die Bewegungsformen des Meeres—Wellen, Gezeiten, Strömungen, 1911. (2nd edit. of Vol. II of "Handbuch der Ozeanographie," by O. Krümmel, 1887). xvi and 766 pp. Maps, diagrams, tables; and index to both volumes. In series: Bibliothek geographischer Handbücher, begründet von Friedrich Ratzel: Neue Folge, herausgegeben von Albrecht Penck. J. Engelhorn, Stuttgart.

have made notable progress. Special problems arose which required detailed study of restricted areas. On the coast of North America, for instance, it was the complicated phenomena of the tides which for years occupied the attention of the Canadian Department of Marine and Fisheries. In the marginal seas of Europe the need of a rational economic treatment of the organic resources of the sea has led to international co-operation on a large scale for the study of the North European seas, an example recently followed for the Mediterranean.

To do justice to this many-sided progress was the task of the new edition of the handbook, an undertaking now carried out by Krümmel alone. Indeed, no one else would have been as qualified as he, since for a generation he had been a leader in the science.

The content has been completely changed. Numerous new computations have been made; an enormous amount of material has been added and remodeled; theories have been tested and disputed questions cleared up; new conceptions and classifications have been established, new points of view gained and new problems formulated. The history of development, the relevant methods and instruments are also discussed under each section. Occasionally, even biological and anthropogeographical relations are referred to. More frequent reference is made to climatological and geomorphological influences. But the physical phenomena themselves always constitute the main theme. These phenomena are both treated in detail regionally and their general laws deduced. The source references are copious; the arrangement and treatment of the subject matter is clear.

The first volume is divided into three parts: (1) the ocean basins; (2) the bottom deposits; and (3) the waters of the ocean. The second volume is also divided into three parts: (1) the waves; (2) the tides; and (3) the currents.

The Ocean Basins. For the respective area of land and water Krümmel presents the new values of 148,800,000 sq. km. and 361,100,000 sq. km., *i. e.*, a ratio of 1:2.43. This section is, for instance, also prefaced by a historical summary in which are reviewed the conceptions as to distribution of land and water since Homeric time. The subdivision of the water surface of the globe leads to the establishment of three great oceans,—a conception already previously advocated by the author. The Arctic Ocean is thus considered only as an appendage of the Atlantic; the Antarctic Ocean is divided up among the three oceans. The representation of the southern hemisphere on Steinhauser's star projection or a glance at

a globe clearly demonstrates the validity of this view. With rare depth of insight the author has established an entirely original classification, in which not only origin, but also position, size, shape, water content and movement are duly considered. The result is a natural system of the oceans. The main categories of subordinate seas [*Nebenmeere*] are the mediterranean seas and the marginal seas. The former are subdivided into intercontinental, or large, the latter into intra-continental, or small seas. The four large mediterranean seas are the Eurafrican, the American, the Australasian and the Arctic. The four small mediterranean seas are Hudson Bay, the Baltic Sea, the Persian Gulf, and the Red Sea. The most typical marginal seas are found on the western border of the Pacific. On the other hand, Krümmel's definition of "ingressional seas" and "faulted basins" [*Einbruchsmeere*] is open to criticism, inasmuch as it reverses the original meaning of "transgressional seas" and "ingressional seas" as introduced by Penck. Krümmel further subdivides the subordinate seas according to their horizontal articulation, their openness, insulosity, salinity (supernormal, normal, subnormal), temperature, and currents (whether independent of or dependent on the oceanic circulation). Similarly, the gulfs or bays and the straits are classified according to position, shape and origin.

The chapter on the surface of the sea deals with the different factors which cause deformation of the sea-level. One hundred meters is given as the maximum amount. The periodic and aperiodic fluctuations amount to only a few meters. The wind is the most general and potent cause of the latter. The reference to the designation of sea-level on nautical charts is important for studies and measurements on such charts. The customary indication is not to mean sea-level but to some stage of low water, differing with each nation. American charts are based on mean low water; British and German, on the low water of the spring tide; French, again, on the lowest recorded stage.

A chapter on deep sea soundings reviews in detail the various types of apparatus, their development, construction and source of errors.

Very important and in a great measure new is the chapter on the general morphology of the ocean bottom. New conceptions are put forward, such as "critical angle of slope," "rhythm of submarine relief," "mean trough width and depth," which define the degree of submarine relief numerically. For the Atlantic between 0° and 47°

N. a mean angle of slope of 0° 27′ 44″ is determined. The regions of especially steep slope are enumerated in a list containing the names of 37 isolated submarine volcanic peaks. The author has also computed the zonal apportionment and the area covered by the various depths. The tropics and subtropics have the greatest proportion of depths over 4,000 m. In the classification of the forms of submarine relief Krümmel follows Supan's well-known suggestions (*Petermanns Mitt.,* 1903). The shelf areas and the characteristic peculiarities of their relief are discussed in detail. The area and elevation of the various shelfs are also given; there is likewise a list of oceanic troughs (22 in number) with their maximum depths. This list is, however, no longer complete, as particularly during the last few years the German surveying vessel *Planet* has discovered many new troughs or sounded known ones more completely. The stated maximum depth of the sea, 9,636 meters, has also become obsolete since the new sounding of 9,788 meters in the Philippine Trough by the *Planet* three years ago. The mean depth of the sea, based on a new computation, is given as 3,680 meters and the volume of ocean waters as 1,330,000,000 cubic kilometers. Nearly half of this volume lies between the tropics. The values for the land block and the water block should also be revised, since Meinardus has demonstrated a surprisingly high mean elevation (2,000 meters) for the Antarctic Continent. The revised values are already given, for instance, in Wagner's *Lehrbuch der Geographie.*

The Bottom Deposits. While an older classification by Murray and Renard distinguishes only between terrigenous and pelagic deposits, Krümmel adds an intermediate type, the hemipelagic deposits. The first group (termed by Krümmel the littoral deposits) he subdivides into shore deposits and shelf deposits. The intermediate group (hemipelagic) consists of blue mud, red mud, green mud, volcanic mud and coral mud. The third group (eupelagic deposits) embraces the five well-known types of ooze: globigerina, pteropod, diatom, radiolarian, and red clay; these are further classified according to their character. The properties and horizontal distribution, the extent and vertical distribution of each deposit are discussed in great detail and illustrated by tables, illustrations and text-maps (on an equal-area projection).

The Waters of the Ocean. In this, the longest section of the first volume, the new material available through international co-operation is utilized very fully. Krümmel also makes use of modern physical chemistry with remarkable thoroughness and applies it in

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all its varied relations to the waters of the ocean as a "dilute solution" (possibly more correctly: a mixture of many dilute solutions). Boiling point, osmotic pressure, evaporation, surface tension, viscosity, compressibility, electrical conductivity and radio-activity are all discussed. Much more space is devoted, however, to salinity and gas content, density, optical properties and especially to temperature. A new definition is given of salinity which will tend to simplify observational methods. All constituent elements of sea-water and their most important combinations are indicated. The total amount of salt is computed to be 48,400 trillion tons. The relation of river salt to sea salt is discussed, together with the origin of the latter. The surface salinity is indicated of each of the subordinate seas and, by five-degree zones, of the oceans. As regards the vertical distribution of salinity, Krümmel distinguishes a number of types (homohaline, anohaline, katohaline, mesohaline, dichohaline), on the basis of which the general distribution of salinity, particularly in the subordinate seas, and its seasonal variations are discused. On the open sea, the most remarkable phenomenon is a minimum of salinity at about 800 meters' depth in all southern waters, as first discovered by the *Gauss*. This is due to an undercurrent from the Antarctic. The density of sea-water at various temperatures is given in a table; also the density maxima for varying degrees of salinity. Transparency and color are dwelt upon at length, from the point of view of absorption as the fundamental principle. The relations to depth of water and clouding by terrigenous and planktonic material are taken up. No cartographic representation is attempted of the distribution of color of sea-water (an excellent map of this type for the Atlantic accompanies G. Schott's *Geographie des Atlantischen Ozeans*). The section on the gases in sea-water is based mainly on the comprehensive material dealing with the European marginal seas, while for the main body of the ocean the older data of the *Challenger* expedition are exclusively used, as the valuable material from the *Gauss* and *Planet* cruises was not yet available. An absorption table is given for oxygen and nitrogen. The function of nitrogen as the regulator of the wealth of organic life is interestingly discussed in the final chapter, based on the original investigations of the zoologist K. Brandt on sea-water as the source of food for pelagic plant life. To be sure, these represent only an initial and still uncertain step into the difficult field of the metabolism of pelagic organisms. Indeed, Gebbing's later researches on the *Gauss* do not seem to agree with these theories.

Heat is transmitted to sea-water mainly by the sun, only to a minimal extent by the interior of the earth. In the thermal conditions of the sea, in contrast with those of the land, wave and current motion and particularly vertical convection are of great importance. The latter subject could not be treated as comprehensively as the subsequent investigations of Nansen on the bottom water in the northern seas might allow. The mean surface temperature has been computed by Krümmel for each ocean by ten-degree zones. The mean surface temperature proves to be 3° C. warmer than the lowest stratum of air over the whole earth; the seas of the northern hemisphere, again, are 3° C. warmer than those of the southern, this predominance of greater warmth in northern waters even holding good for the corresponding zones in both hemispheres; the Pacific Ocean is 2.2° warmer than the Atlantic. A new conception is that of the "individual temperature variation." This is defined as the variation of temperature undergone by a water particle moving forward in a current. As regards the vertical distribution of temperature the same types are recognized as for salinity. A map of the horizontal distribution at a depth of 400 meters shows how the equatorial surface belt of maximum temperature is split into two subtropical maximum belts enclosing a belt of relatively minimum temperature. This phenomenon increases with increasing depth and is explained by Krümmel as due to the existence of vertically descending currents and a lateral depression of the warm water of the equatorial currents. The sub-surface temperatures of the northern seas are discussed in special detail. Broad perspectives are opened up by the brief discussion of the mean temperature of oceanic waters, which has been computed for the first time by ten-degree zones, and of the thermal interchange between sea and air. Finally the last chapter is devoted to the ice phenomena of the ocean, from the processes of the formation and transformation of ice to the laws governing its distribution.

The Waves. Waves are first considered as to their dimensions and their properties in deep and shallow water, using the trochoidal theory as a basis. Its formulæ are then tested by means of observed and measured instances, including measurements by photogrammetry, and are found to conform well for deep water. The origin of waves Krümmel explains, after giving an historical survey of older theories, according to Helmholtz's law. He then discusses the growth of waves with a continuous wind, the relation of wave velocity to wind velocity, the evolution of the ground swell from the

wind-created wave, and the factors causing the extinction of a wave. Among these factors inner friction is of small consequence as compared with lateral expansion, newly developing wind-created waves, breakers on the coast or extraneous objects like drift-ice, rain or snow and oil. The discussion of the surf gives the author opportunity to illuminate problems of coastal physiography, on which occasion the power of wave action is ably analyzed from the oceanographical standpoint. Coastal shifting due to along-shore erosion (Philippson's "Küstenversetzung", for which Krümmel suggests "Strandvertriftung") Krümmel ascribes to the same cause, wave erosion, as do modern physiographers. Such abnormally large waves as earthquake waves, etc., Krümmel attributes in the majority of cases to tectonic origins, while the seismologist Rudolph considers them predominantly of volcanic origin. Considerable space is devoted to standing waves, or seiches, whose widespread occurrence also along sea coasts is becoming more and more known. Finally, the first connected account is given of the phenomenon of internal waves, to which students of hydrodynamics and oceanography (Ekman, Nansen) have only recently devoted attention. These are waves which are formed on the tangential surface of two moving layers of water of different density and velocity.

The Tides. No phenomenon of the sea is so hard to demonstrate in a simple, not too mathematical and yet thorough way as the tides. Krümmel first defines the various concepts relating to tides, then discusses the methods of measuring them, and finally develops the theory of tides, beginning with the equilibrium theory and proceeding through the various dynamic theories to harmonic analysis. In spite of the age of the equilibrium theory (Newton) and the general acceptance of its principles, new attempts are constantly being made to express it clearly and accurately, but in a simple mathematical form. Much less securely established are the dynamic theories, which attempt, on the basis of the former, to interpret mathematically the multiplicity of terrestrial phenomena. Of these the most important rival theories are the standing wave theory of Ferrel and Harris and the canal theory of Airy and Börgen. Krümmel rejects Harris's theory with its division of the ocean into separate and independent oscillatory regions and on the whole gives preference to the canal theory as developed by Börgen. In a chapter on tidal currents the most important section is a very clear explanation of rotatory currents. Many examples of tide action in river estuaries are discussed. After all these abstract and rather physical chapters

there follows an extended and strictly geographical account of the regional distribution and individual characteristics of the tides along the various coasts of the ocean and its arms. Special emphasis is laid on the latter, particularly those of the North Atlantic and of the Australasian Mediterranean. For the high seas and even for the coasts of the open ocean the observational records are still very incomplete. Krümmel nevertheless attempts a broad synthetic characterization for the Atlantic Ocean on the basis of the values for the establishment of the ports, but at the end he confesses resignedly: "For the time being everything is still as if enveloped in fog."

The Ocean Currents. The methods of observing currents are first discussed, from the determination of leeway displacement and the instruments employed—their increasing use is only of recent date—to the drift-bottles, natural drift objects and indirect evidences (temperature, salinity, plankton). Computational methods are also discussed, especially those for current direction and current stability. Then follow the theory of currents and finally the description of existing oceanic circulation. The theoretical discussion is based on the assumption that the wind is the primary causative agent, however no longer according to Zöppritz, who did not take into account the effect of the earth's rotation, but in modified form according to Ekman's new mathematical investigations. According to this theory, a surface current, however long the wind may blow, cannot be transmitted to an unlimited depth but, rather, disappears at a relatively short distance from the surface. This depth, at which the direction of the surface current is changed into the contrary by the earth's rotation and its velocity nearly consumed by friction, is known as the "frictional depth" [*Reibungstiefe*]. Krümmel terms the factors affecting a current "current constituents" and divides them into active, or primary, and passive, or secondary. This division in itself is very important and corresponds to the facts, but the terms "constituent factors" and "modifying factors" would seem more appropriate. The theoretical investigations which attempted to determine quantitatively the deflectional influence of the rotation of the earth are confirmed to a certain extent by several statistical studies which, by comparing the direction of the wind and of currents, determined the angle of deflection in various seas (Arctic Ocean, Baltic Sea, Mediterranean Sea, Indian Ocean). These values average 45°. Another modifying factor, the configuration of the coast line, leads to distinguishing between "forced," independent and compensatory currents. In-

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stead of the wind theory of ocean currents various others have recently been suggested (Nansen, temperature; Pettersson, ice-melting) which are all more or less based on density compensation. Krümmel evaluates this factor correctly in according it only a secondary position as a current-producing agency. Currents due to density compensation are represented, on the one hand, by the cold bottom water which, with its polar beginnings, constitutes one section of a great but slow vertical current system and, on the other hand, in straits which connect basins of different density. Such are the Strait of Gibraltar and the sounds between the North and Baltic Seas; in the former case, the subordinate sea (Mediterranean) has the denser water, in the latter case it (Baltic) has the less dense. While in these theoretical discussions reference is rarely made to the actual conditions of the ocean, the survey of the ocean currents in the last section is constantly correlated with the preceding theoretical expositions, so that here the attempt is first made to bring theory and observation into coincidence or to explain the natural phenomena by means of the theory.

The section on currents alone occupies one-quarter of the whole work and possibly represents the most important advance in oceanographic science. It also best reveals Krümmel's masterly gift to hew a path through a chaos of new material and from the rough stones not only to erect a homogeneous edifice but also to keep a lookout from every one of its vantage-points, to open up new vistas and to discover gaps.

AN INTERPRETATION OF THE DISTRIBUTION OF THE REPTILES IN MAGGIE BASIN, NEVADA

By ALEXANDER G. RUTHVEN

In a recent paper[1] on the reptiles and amphibians of Maggie Basin, in northeastern Nevada, it was shown that the distribution of the species of these groups apparently corresponds closely with the distribution of certain environmental conditions chief of which are the presence of water, the nature of the soil and the presence of rocks. Since the distribution of the species is thus associated with physiographic features, it may be expected to exhibit characteristics due to changes in the geographical cycle and thus to be open to a more complete interpretation from this point of view. It is the purpose of this paper to discuss the effect of the geographical changes upon the habi-

[1] The Reptiles and Amphibians collected in Northeastern Nevada by the Walker-Newcomb Expedition of the University of Michigan. By Alexander G. Ruthven and Helen Thompson Gaige. *Univ. of Mich. Museum of Zool. Occ. Papers No. 8.*

tats, to show that the distribution of certain species may be explained by the geographical history of the region, and to consider the probable succession of habitats and fate of the associated species. Only the reptiles will be considered.

Description of the Region. Maggie Basin is a small intermontane basin in the Great Basin region. It is situated in northeastern Nevada, between the Cortez, Seetoya, Pinyon and River Ranges, in Elko and Eureka Counties. The lowest part of the basin has an altitude of 4,930 feet at Carlin and the surrounding mountains rise rather gradually from it, except the Cortez Range which has a steep eastward slope and reaches an elevation of 7,754 feet.

The climate is arid. The mean annual precipitation is about 7.22 inches, and as little as 2 inches may occur in one year. Much of the precipitation is in the form of snow and over 80 per cent. occurs between the months of November and May inclusive. During the summer months high temperatures (100°-106° F.) are frequent, and there are large diurnal variations in temperature (as great as 60°-64° F.). Killing frosts occur in all months.

The predominating vegetation is the open sage-brush association which occurs everywhere except on alkali spots, the immediate margin of permanent mountain streams and in the wide valley of the Humboldt River and the lower parts of tributary valleys. Along the permanent mountain and basin streams there are small groves of trees and shrubs, and in the valley of the Humboldt and the lower part of the tributary valleys the sage-brush is superseded by a zone of *Chrysothamnus pinifolius* Greene, and this in turn by a zone of grasses, principally *Elymus condensatus*.

The basin has drainage discharge to a lower level through the Humboldt River, which crosses the southern end. It is strongly aggraded, and the waste is piled high on the surrounding mountains. The general level of the basin floor deposits slopes to the wide valley of the Humboldt River and the valley of Maggie Creek in the middle of the basin, but they are deeply trenched, the valleys being continuous with the deeply cut mountain valleys.

With the exception of a few small mountain streams which flow directly into the Humboldt where it approaches the mountains, the streams are grouped into three minor systems known as Annie, Maggie and Susan Creeks. Maggie Creek is perennial; the other streams are intermittent. Many of the headwater branches in the mountains are also intermittent, while others exist ordinarily as disconnected and often discontinuous streams. It is only during the spring months and cloudbursts that these headwater branches unite and reach the main streams and the Humboldt River. Both the Humboldt River and Maggie Creek are meandering streams which flow through flat valleys and in the dry season do relatively little work.

The soil is principally a stony loam, which is coarser toward and on the mountains and becomes finer toward the middle of the basin. In the valleys of the Maggie and Humboldt and the mouths of the branch valleys the soil is a fine silt-like loam which is easily blown about by the wind, except close to the streams, where it is held by the greater growth of vegetation. The rock outcrops are, with one exception, confined to the mountains. The exception is a small hill near the middle of the basin. In the mountains they occur at all altitudes and, except in the canyons where Maggie Creek and the Humboldt River flow through the mountains, are relatively small and mostly broken up into large blocks. In Moleen Canyon and where the Humboldt flows across the

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end of the Cortez Range there are rock cliffs, but these have been buried nearly to the summits with talus.

The general geographical conditions are apparently easily interpreted. The basin has been strongly aggraded and the deposits subsequently dissected. The dissection is still going forward, but the meandering nature of the permanent streams which carry the waste to lower levels, the small amount of precipitation, and the binding effect of the vegetation on the soil combine to keep transportation less effective than weathering. Thus, while the general tendency of the dissection is to expose the rocks of the buried mountains—and they have been uncovered where dissection has been most rapid, *viz.*, in the canyons where the trunk streams enter and leave the basin and on the small hill in the center of the basin—the outcrops are, in general, being broken up rather than exposed.

Habitats. The diversity of the topography gives a variety of environmental conditions to which the reptilian fauna responds. The relation between the environment and the fauna, as determined by field work extending over eight weeks in the summer of 1912, is shown in the following table.

LOCAL DISTRIBUTION OF THE REPTILES IN MAGGIE BASIN, NEVADA

ECOLOGICAL DISTRIBUTION	GEOGRAPHIC DISTRIBUTION			ABUNDANCE
	On basin floor only	Basin floor and mountains, all altitudes	In mountains only	
Terricolous species, occurring in all land habitats		*Pituophis c. sayi*		Apparently common throughout
		Bascanion c. vestutum		
		Bascanion tæniatum		
Terricolous species, apparently preferring vicinity of rocks but not confined to them		*Crotalus lucifer*		Common in mountains, rare on basin floor
Terricolous species, found only on fine soil	*Phrynosoma hernandesi*			In two places, not uncommon
	Crotaphytus wislizenii			In one place, not common
	Cnemidophorus tigris			In one place, common
		Sceloporus graciosus		Common on basin floor, rare in mountains
Saxicolous species, occurring on rock cliffs or on or in immediate vicinity of rocks		*Sceloporus biseriatus*		Common in mountains, rare on basin floor
			Crotaphytus c. bail yi	Rather common in one place near base of mountains
			Uta s. nevadensis	In two places near base of mountains, common
			Eumeces skiltonianus	In one place (7,500 ft.), rather common
Limnicolous species, occurring in immediate vicinity of permanent streams	*Thamnophis o. elegans*			Common

There are basin floor forms, montane forms, and forms which have a more or less general occurrence, but there is no zonal distribution with altitude. The species which occur principally or only in the mountains are those which live on or among rocks. *Sceloporus biseriatus* and *Uta stansburiana nevadensis* are scansorial forms which are practically confined to rocky places; the *Sceloporus* is only rarely observed on the ground. *Crotaphytus collaris baileyi,* while not strictly scansorial in that it does not live on vertical cliffs and is often found on the ground, occurs only in the immediate vicinity of rocks about which it climbs and among which it seeks concealment. *Eumeces skiltonianus* is a secretive ground form which finds concealment among rocks. Although not strictly a saxicolous form, *Crotalus lucifer,* a ground species which is principally nocturnal and lives among the rocks or on open ground, seems to be chiefly confined to rock habitats, where it finds concealment during the day.

The montane species are not confined to any altitude and the more closely they are associated with rocky habitats the more discontinuous is their distribution. This is best shown by the most common species, *Sceloporus biseriatus,* which occurs wherever there is an outcrop, from the valley of the Humboldt to the summits of the Carlin Peaks, and nowhere else. The discontinuous and chiefly montane distribution of the forms of this group may then be attributed to their association with rocky habitats, and by assuming that the present outcrops are remnants of much larger exposures which at an earlier time in the cycle were connected.

It should be noted that this conclusion does not require the further assumption that the saxicolous forms cannot cross the soil areas between outcrops, although such migrations must be very rare, for not a single specimen of any of these species was found except on or near rocks. The general absence of the species from the areas covered with soil would seem to show that they cannot thrive under such conditions, so that one may grant occasional migrations between outcrops and still be led to the conclusion that the fate of the species will be that of the exposed rock areas.

The species confined to the basin floor are not scansorial in habit. *Phrynosoma hernandesi, Crotaphytus wislizenii,* and *Cnemidophorus tigris* are all ground forms which do not even climb about in the sage bushes and are confined to areas of fine soil on the floor of the basin; and *Thamnophis ordinoides elegans* is a ground and semi-aquatic species confined to the vicinity of permanent streams. For some undetermined reason, however, the first three species are very local in distribution, so that the association with habitats characterized by a fine soil may not be the determining factor in the distribution. On the other hand, *Sceloporus graciosus* is a common form and, while not strictly confined to the basin floor, is rare in the mountains and also on the basin floor except on the finest soil on the sides of the valleys of Maggie Creek and the Humboldt River, where it occurs in great abundance. This species climbs about in the sage bushes, but is principally a ground form and is not found in rocky habitats in the region studied.

The distribution of the basin floor forms is apparently continuous, and the common species, *Sceloporus graciosus,* occurs at all altitudes. The distribution of *S. graciosus* at least may then be explained by its association with fine soil and the fact that such soil is to be found principally along the valleys of the largest streams at this stage of the cycle.

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The three species which are found in apparently equal abundance in the mountains and on the basin floor, *Bascanion constrictor vetustum*, *B. taeniatum*, and *Pityophis catenifer sayi*, are apparently equally at home in all habitats, regardless of the nature of the soil or the presence of rocks.

The Succession of Habitats. If the topography and distribution have been correctly interpreted, one must conclude that in this region the habitats of the terricolous forms are being extended at the expense of those of the rock dwellers as the land is being reduced to a base level; and that if the rate of dissection is not increased the latter will become extinct, while the terricolous species are destined to become the dominant elements in the fauna. The distribution of the reptiles in Maggie Basin thus in large part admits of a physiographic interpretation and provides an example of the influence of baseleveling upon the distribution of animals.[2]

[2] Compare J. B. Woodworth: The Relation between Baseleveling and Organic Evolution, *Amer. Geol.*, Vol. 14, 1894, pp. 209-235; and Charles C. Adams: Baseleveling and Its Faunal Significance, with Illustrations from the Southeastern United States, *Amer. Nat.*, Vol. 35, 1901, pp. 839-851.

PHOTOGRAPHS OF GEOGRAPHICAL INTEREST IN WASHINGTON

The Forest Service has a collection of 30,000 photographs mounted, labeled, and classified. In addition, there are 70,000 other negatives. The photographic collection is in charge of an attendant who gives her whole time to the work and who assists inquirers. The photographs are sold at 10 per cent. advance on the cost of printing, and average from 6 to 15 cents each. Lantern slides are made of any photograph and sold at 40 cents each. The Service has also a large collection of lantern slides illustrating various phases of forestry and related subjects, from which sets are loaned to reliable persons or institutions for short periods, the borrowers paying transportation charges and assuming responsibility for loss or breakage. An outline of the subjects of these slides is furnished on request.

The Forest Service also has a set of 44 large, mounted photographs, arranged in 11 series, 4 in each series, illustrating some special feature of forest work or forest conditions in the United States. Each series of 4 photographs is mounted on a strip of green denim cloth, with eyelets at the upper end for hanging on the wall. The exhibit may be engaged for a short loan by any school, library or educational institution willing to pay the transportation charges.

The Forest Service has prepared 64 samples of commercially important woods of the United States, with short statements of their principal uses and physical characteristics, maps showing the regions in which they grow, and maps and charts of wood production. The material is arranged on photographic mounts measuring 16½ by 10 inches each, and these mounts are affixed to strips of green denim, four on each strip, with eyelets in the upper corners for hanging. The exhibit is loaned to any institution paying the transportation charges.

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The Reclamation Service has a collection of nearly 10,000 photographs showing all of the government irrigation projects. The photographs illustrate the following: (1) conditions of vegetation before irrigation; (2) all stages in the progress of dam-construction; (3) completed dams; (4) various methods of applying the water; (5) crops and orchards under irrigation; (6) miscellaneous matters related to reclamation work. The photographs are mounted in scrap books showing, in an orderly manner, the development of the project from beginning to end. The scrap books are labeled with the name of the particular project which they illustrate, and each photograph has its title and number. The collection is in charge of an attendant and inquirers have every assistance. The photographs are sold at 25 and 35 cents each. Lantern slides of exceptionally fine quality are sold at 25 cents for uncolored slides and $1.00 for colored. Traveling sets of slides may be obtained, the borrower paying transportation charges both ways and for any slides broken.

The U. S. Geological Survey has a collection of 60,000 photographic negatives taken by the field geologists and government photographers for more than forty years. They are classified under subjects—canyons, craters, caves, volcanoes, etc.—and are mounted in albums (over 100), which may be inspected by interested persons. Extra copies of the photographs may be ordered and are sold at prices ranging from 5 to 60 cents, according to the size. A special album has been prepared covering 400 type views illustrating nearly every type of geological and physiographic feature. This is sent to persons who may wish to make selections of 50 or more subjects. Other views are not sent out on this basis, but anyone who desires views for some particular purpose may write of his needs and a member of the staff will make the selection for him, or photographs may be ordered corresponding to the illustrations in any of the Survey's printed reports. Lantern slides are made from any of the photographs at 40 cents each for uncolored views and from 30 to 60 cents extra if colored.

The Bureau of Mines has a collection of several hundred photographs in the Washington office and a still larger collection in the Pittsburgh office. Many of them have to do with safety devices, mine rescue work and the like. There are, however, excellent photographs of coal-mining and coal-handling scenes and a limited number of views showing mining operations. Persons in search of photographs may personally inspect the collection and select views, or they may address the Director of the Bureau of Mines, Washington, describing their needs, and photographs will be sent to them. They are supplied at the cost of printing and mailing.

The various divisions of the Department of Agriculture other than the Forest Service have large collections of photographs, labeled and classified. They are kept in the offices of the various divisions of the Department. The collections are mainly for the use of the Department, although inquirers are given assistance in securing desired photographs.

Since copies of all copyright photographs must be deposited with the division of copyrights, the government has accumulated a very large and very fine collection of general photographs. The most desirable of these are classified and stored in the division of photographs of the Library of Congress. These are not sold or loaned, but the name of the photographer appears on the print and copies may, in most cases, be secured from the maker.

R. H. WHITBECK.

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GEOGRAPHICAL RECORD

NORTH AMERICA

Selling U. S. Topographic Sheets. An innovation by the Post Office Department at Washington is likely to increase the distribution of our topographic sheets. Most of these maps have heretofore been sold to the public from Washington. Now, however, postmasters in towns and villages have permission to handle the maps. When the Geological Survey prints a new map it sends a sample copy to postmasters in the area covered with the suggestion that they exhibit it and order a small stock to sell to those who wish the map. Postmasters receive a small commission on their sales. Many postmasters are now handling the maps, and an increasing number are sold in this way.

The State Geographical Society of New Mexico. This society was organized in October, as the *Bulletin* is informed by the *University of New Mexico Weekly* (Oct. 19). David Ross Boyd, Ph.D., President of the University, was elected President, Governor McDonald, Senator Catron, Ex-Governor Prince and Professor C. T. Kirk, Vice-Presidents, and R. J. Palen, Treasurer. These officers, with six other gentlemen who were appointed, will form the Geographical Board which will direct the work of the society. The chief function of the society will be to recommend nomenclature for various historical places and landmarks, to gather new data on various places in the state of historic interest and to work for the preservation of the old Spanish and Indian names. The society will endeavor to throw new light on many historic facts and localities of which most of the people of the state are ignorant. For example, while California has made her missions known to the world, New Mexico's missions have scarcely been mentioned by writers on the state though many of them were old or decayed before those of California were founded.

Further Surveys of the Kuskokwim River, Alaska. The survey parties of the Coast and Geodetic Survey in Alaska have closed work for the season and returned to Seattle. The steamer *Yukon*, R. R. Lukens commanding, continued the survey of the Kuskokwim River, the channel into which was charted during the previous season, opening up a vast region in the interior of Alaska (*Bull. Amer. Geogr. Soc.*, Vol. 47, 1915, pp. 205-206). The work was extended to the head of deep water navigation at Bethel, 155 miles above the mouth of river. No shifting of channels or changes of depths were noticed. The mud flats along Eek Channel appear unchanged from the previous season, contradicting the theory that these channels change every year when the ice goes out. The steamer *Alliance*, piloted by H. A. Cotton of the Coast and Geodetic Survey, carried a greater draft (17 feet) to Bethel than had been carried before by any vessel.

Several other vessels of the Survey spent the season in various bays and rivers, charting channels and searching for hidden obstructions to navigation, a number of which were discovered.

Large Development in the Juneau Gold District. An examination of mining developments in the Juneau region, Alaska, was made last year by Henry M. Eakin, of the United States Geological Survey, whose report has been published as *Bulletin 622–C*. The developments near Juneau overshadow in magnitude the operations in other parts of the gold belt. Gold lode mining in this field, already developed on a scale that places the Juneau district in line with the foremost in the industry, is rapidly assuming still greater proportions. The growth is a natural result of a fuller knowledge of the size and character of the ore bodies and of the economic possibilities of operations on a large scale.

The climatic conditions are favorable to continuous operation. The large size of some of the ore bodies, the character of the ores, and the strong topo-

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graphic relief of the region favor the production of large quantities of ore with a minimum of labor and power. Water power, marine transportation, and a sufficient local supply of timber and lumber reduce general expenses to a low point. The very small cost of operation makes it possible to work profitably low-grade ores that under conditions only slightly different would be valueless (*U. S. Geol. Survey Press Bulletin*).

Florida Canals. The east coast of Florida now has a chain of natural protected thoroughfares along the greater part of its length, navigable by vessels of light draft. Connecting canals, constructed by a corporation operating under state charter, are of insufficient dimensions, and a Florida association is urging Federal acquisition and improvement. In the southern portion of the state a series of canals is under construction by a state commission with the object of draining the Everglades, creating a great area of cultivable land as well as providing free passage across the state between the Atlantic and Gulf coasts. Furthermore, the state possesses a magnificent natural waterway in the St. Johns River, leading from the port of Jacksonville far into the interior of the fruit-growing district, and it is anticipated that this river may be connected at some point with the Gulf intracoastal survey in order to form one of the links in the intracoastal chain from Florida to New Orleans.

The engineers' report on the Atlantic intracoastal survey, within the limits of Florida, says that a seven-foot depth is already authorized or under construction between Charleston, S. C., and Jacksonville, Fla. Boats of eight-foot draft, under existing projects, will soon be able to ascend the St. Johns River 170 miles to Sanford on Lake Monroe, which is very near the Everglades basin where the state projects are under way. Along the east coast of Florida, between the St. Johns River and Key West, channels now exist that offer a four-foot draft, and further improvement by the Federal government is not recommended under present conditions. The engineers anticipate that an improved route between the St. Johns River and the Gulf, when constructed, will proceed across the state and not around it ("The Atlantic Intra-Coastal Waterway," published by the Atlantic Deeper Waterways Assoc., Philadelphia, 1915, p. 3).

The Record of the United States in Geography, 1889–1913. Mr. Henry G. Bryant of Philadelphia read a paper at the meeting of the International Geographical Congress at Rome in 1913, giving a résumé of exploration and other geographical achievements by governmental agencies and citizens of the United States for the 24 years ending in 1913. It appears in the *Proceedings* of the Congress issued last year and embraces 40 pages of condensed information. The paper deals with the geographical work of the Geological Survey, the Coast and Geodetic Survey and other governmental agencies, of the various geographical societies and of Americans in foreign countries and in the Arctic.

Work of the Blue Hill Meteorological Observatory. It is a great satisfaction to be able to record the continued activity of Blue Hill Observatory, long known throughout the scientific world because of the many important contributions which the late Professor A. Lawrence Rotch and other members of his staff made to meteorology during the first quarter-century of that observatory's existence. The work goes on, thanks to the endowment left by Professor Rotch, and thanks also to the splendid generosity of Mrs. Rotch, who is making possible, by her interest and her support, the continued activity of Blue Hill Observatory on a scale worthy of the founder's ideal. Meteorology owes Mrs. Rotch a debt which it fully realizes and is glad to acknowledge.

Under Professor Alexander McAdie, the new Director, the work at Blue Hill is going forward, successfully, actively, and with the high standards that have distinguished its past. A recent publication (Observations and Investigations made at the Blue Hill Meteorological Observatory, Massachusetts, U. S. A., in the years 1911, 1912, 1913, and 1914, under the direction of Alexander McAdie, *Annals Astron. Observatory of Harvard College*, Vol. 73, Part 2, pp. 95-177, Cambridge, Mass., 1915) contains the observations made at the three ground stations and in the free air at Blue Hill during 1911-1914, a short statement on

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the advance of the seasons based on the records for 1886-1914, and a discussion of temperature inversions as related to frost, by Professor McAdie. The summaries now give, for the first time, temperatures in degrees absolute, and pressures in kilobars. R. DEC. WARD.

The Hottest Region in the United States. Mr. G. H. Willson, District Forecaster of the Weather Bureau at San Francisco, under the title "The Hottest Region in the United States" has recently discussed the meteorological record kept at Greenland Ranch, on the edge of Death Valley, Cal., from the spring of 1911 to May, 1915 (*Monthly Weather Rev.*, June, 1915, pp. 278-280). The station is conducted by arrangement between the Weather Bureau and the Pacific Coast Borax Company. The most interesting single observation is that of a maximum of 134°, on July 10, 1913, which seems to be the highest yet recorded at any definitely established station. Temperatures of 120° or more have been recorded in May, June, July and August. The mean of the monthly maximum temperatures has exceeded 100° from May to September every year with one exception, when the record was 95.4°. The maximum temperature has reached or exceeded 100° on 548 days in the four years of the record. A condensed temperature table is included in the paper, which will have an interest for those who are looking for somewhat sensational temperature data for this country. R. DEC. WARD.

Rainfall of the United States. Mr. B. C. Wallis, who has already published studies of the rainfall of the northeastern and the eastern United States (*Monthly Weather Rev.*, Jan., 1915, pp. 11-14 and 14-24, respectively), continues his investigation in a paper on the rainfall of the western United States (*ibid.*, April, 1915, pp. 170-175). Twelve monthly charts of *equipluves* are given, as well as diagrams of rainfall intensities and charts showing the driest months, wettest months and rainfall regions in the western United States. The author concludes that the rainfall of this country as a whole is determined by (1) continental influences, exerted over a broad triangle with the vertex to the south and with the edge of the Rocky Mountains as the eastern side; (2) oceanic influences exerted over the coastal lowlands, on the west from the Pacific and on the east from the Atlantic; (3) intermediate regions, viz., the Rockies and the western Appalachians; and (4) direct solar influences, along the southern boundary as far west as Yuma, Ariz.

In another paper, on "The Rainfall Régime of the Several States" (*ibid.*, April, 1915, pp. 176-178), Mr. Wallis gives a chart showing the approximate grouping of the states as rainfall sections. This is based upon the data from which the *equipluves* considered in the previous paper were constructed. The great areas of single summer maximum over the northern Plains and stretching east to the Lakes, the Pacific coast single winter maximum, the northern Basin and Plateau district, with its primary maximum in winter and secondary maximum in May, are all clearly shown. R. DEC. WARD.

Area of Heaviest Snowfall in the United States. Our heaviest snowfall occurs in the high Sierra Nevada of California, especially along the line of the Southern Pacific Railway which connects Sacramento and Reno. This snowfall is discussed by Andrew H. Palmer in a recent paper (*Monthly Weather Rev.*, May, 1915, pp. 217-221). Over a considerable area more than 100 inches of snow falls every winter. The average seasonal snowfall for 44 years was 419.6 inches at Summit (7,017 feet) and 521.3 inches for 8 years at Tamarack (8,000 feet). In the winter of 1879-80, 783 inches of snow fell at Summit. As is well known, the measurement of snowfall presents many difficulties. The Marvin shielded gauges have been found by the Weather Bureau most satisfactory for new snow, but there is a growing demand in California for a simple and practicable method of measuring deep snow, on the ground. The heavy snowfalls at and near Summit are not accompanied by high winds, as on our Eastern mountains, at Mt. Washington, N. H., for example. Railroad operation in this district shows many direct responses to the heavy snowfall, as all travelers over the Southern Pacific route, through Summit, well know. The famous "thirty miles of snowsheds" cost on an average $150,000

a year for upkeep and renewals. The danger of fire is so great that fire-fighting trains are kept always in readiness, summer and winter. In connection with this discussion, reference may be made to the snowfall chart of Dr. C. F. Brooks (*Quart. Journ. Roy. Meteorol. Soc.*, Vol. 39, April, 1913), in which a small area in the Cascade Mountains, close to the Canadian border, is shown to have a mean annual depth of snow of over 400 inches. R. DEC. WARD.

The Weather and the Potato Crop. The relation between weather conditions and the yield of various crops in the United States has been studied, in recent years, by several investigators. Professor J. Warren Smith, of the U. S. Weather Bureau, has given attention to the effect of weather upon the yield of potatoes (*Monthly Weather Rev.*, May, 1915, pp. 222-236). While the study is confessedly not complete, it supplies some advance in our knowledge of the subject. Numerous charts illustrate the average dates of planting, digging, number of days between planting and digging, temperatures at dates of planting, rainfall during growing period, thermal constants, sunshine, etc. The planting and digging of early potatoes naturally progresses from south to north, but in the case of late potatoes from north to south. The mean daily temperature, on the date when the planting of early potatoes begins, is close to 45° Fahr., except in the extreme southern portion of the country, near the Gulf. The best yield of potatoes is not where the greatest amount of rain falls, and the daily amount of heat necessary for the potato crop is greatest in the central districts, where the rainfall is greatest. More detailed study of the Ohio potato crop shows a marked relation between the mean July temperature and the potato yield, and also shows that the rainfall is not so important a controlling factor as temperature. R. DEC. WARD.

The Wood and the Plains Buffalo. The wood buffalo, according to G. A. Mulloy (*Ann. Rept. Dept. Interior Canada for year ending March 31, 1914*, Vol. 2, Part 6, pp. 108-112), is now found chiefly in the extreme northern part of Alberta, west of the Slave River, between the Peace River and Great Slave Lake. The animals are scattered all over this region in small bands or singly. The temperature in winter may fall far below zero but the air is dry, the snow is not deep enough to cover feed beyond reach, and the animals take shelter, in very severe weather, behind a timber-covered bluff or in some slough surrounded by bush. Mr. Mulloy says the wood buffalo do not now number over 500 to 550 head. They are likely, however, to hold their own and gradually increase, as the Indians are forbidden to kill them and the Northwest Mounted Police enforce this prohibition. Strays from a herd may be killed by wolves but buffalo in a band are not afraid of these animals. Mr. Mulloy believes that the wood buffalo is considerably larger than the buffalo that formerly wandered over our western plains. Some of the bulls are enormous in height and weight, and the skulls of dead animals seem to indicate larger development than that of the plains buffalo.

In Buffalo Park, Wainwright, southeastern Alberta, some 400 miles south of the southern limit of the wood buffalo's present range, there were 1,453 plains buffalo in 1914, an increase of 234 head over the preceding year (*Ann. Rept. Dept. Interior Canada for year ending March 31, 1914*, Vol. 1, Part 5, pp. 55-58). There are also herds of the plains buffalo in the Dominion at Banff and Lamont, Alberta. Thus the efforts of both the United States and Canadian governments, and other agencies, will probably prevent the extinction of this animal, which, a few years ago, seemed impending.

CENTRAL AMERICA AND WEST INDIES

Geological Survey of Panama. It was announced last year that an investigation of the geology of Panama was to be made under the joint auspices of the Isthmian Canal Commission, the U. S. Geological Survey and the Smithsonian Institution. This work is now in progress. The *Annual Report of the Smithsonian Institution for 1914* (p. 12) says that the general plan includes a systematic study of the physiography, stratigraphy and structural

geology, geological history, geological correlation, mineral resources (including coal, oil and other fields), petrography and paleontology of the Canal Zone and of as much of the adjacent areas of the isthmian region as is feasible. When the work is completed, the Institution will print a general account of the results, and later a detailed report of the geological data of the isthmus and adjoining regions will be published.

SOUTH AMERICA

The Development of Rosario, Argentina. With a phenomenal growth of population and trade Rosario ranks as the second city of Argentina. In 1851 the population was only 3,000; in 1900, 112,000 and in 1913 over 233,000. Immigration has been the chief factor of increase; over 45 per cent. of the present inhabitants are foreign-born. Commercial progress has been still more remarkable. Rosario is now the first port for the shipment of maize and linseed and second only to Buenos Aires for wheat and oats. Its rivalry with the latter port may be said to date from the commencement of harbor construction in 1902: the commercial movement has increased from 1,000,000 tons in that year to 4,250,000 tons in 1913. Situated on a great river and at the convergence of seven railroads in the greatest cereal-producing province of the country, Rosario has a wide sphere of economic influence. Her distributing ground extends from Mendoza and the foot-hills of the Andes to the Paraná watershed of Entre Rios and Corrientes and even into Bolivian territory. (*Diplomatic and Consular Reports, Annual Series No. 5458,* London, 1915.)

Climate of Quito. Many writers have described the climate of Quito as "perpetual spring." This it is, in some respects, being much like early May in parts of central Europe. Quito's mean temperature, its variable weather, with frequent afternoon rains and even hail in the rainy season, its fairly large periodic diurnal temperature ranges—these are more or less similar to Europe's spring. But there are many points of difference, and Quito has climatic characteristics which are far from "perfect." The contrast between its burning afternoon sunshine and its cool nocturnal hours is so great as to be keenly felt. Its explosive rains are chilling. Under clouds, or during rains by day, and during the hours when the sun is below the horizon, the sense of chill is universal and is uncomfortable. Most Europeans suffer from the cold. The lack of proper heating facilities in the houses adds to the discomfort. Warm clothing is essential, and the traditional tropical outfit is inappropriate, as well as uncomfortable. Thus, there are two sides to the picture of Quito's climate. The interest in the subject is stimulated by the contrast, and by the widely varying opinions which have been expressed upon it. The latest discussion of this matter is contained in one of Professor J. von Hann's important series of papers dealing with the meteorology of the equator (III: "Meteorologie des Hochtales von Quito," *Sitzungsber. Kgl. Akad. Wiss. Wien., math.-naturwiss. Klasse,* Vol. 124, Nos. 1 and 2, 1915). R. DEC. WARD.

Argentine Weather. Mr. H. Helm Clayton, formerly of the Blue Hill Observatory (Mass.) and now of the Argentine Meteorological Office, is making a special study of forecasting in Argentina. A paper entitled "A Study of the Moving Waves of Weather in South America," by Mr. Clayton, was recently read before the Royal Meteorological Society of London (*Quart. Journ. Roy. Meteorol. Soc.*, Vol. 41, 1915, pp. 201-207). The author notes that the charts showing the weather conditions over the South American continent indicate permanent centers of high pressure at about 30° S. latitude. These high-pressure systems oscillate slowly back and forth over limited areas, and there is a series of low-pressure systems passing from west to east immediately south of the continent, viz., in about 60° S. latitude. An examination of the charts of daily pressure and temperature changes seems to show that these changes are in the nature of waves, which, appearing first in the extreme south of South America, progress northward or northeastward. Diminishing in intensity, they die out or disappear near the equator. It is evident that these waves of changing pressure do not follow the movements of centers of high and

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low pressure, but are independent phenomena causing changes in the distribution of pressure and in the shapes of the isobars, and in this way giving rise to changes of wind and weather. In order to raise forecasting from an art to a science, Mr. Clayton believes it is essential to replace mental estimates by quantitative measurements of expected changes, and to make quantitative forecasts. He has applied this principle to the Argentine weather map for April 20, 1910, and gives the map of pressure predicted in this way for April 21, together with the map of the observed pressures. There is a marked similarity in the trend of the isobars in the two maps. The daily temperatures at 8 A. M. were plotted for four stations for May and June, 1910, and these revealed two classes of waves, taking about three and six days respectively to pass from Punta Arenas to Rio de Janeiro. R. DEC. WARD.

AFRICA

A Steel Steamer on Lake Tanganyika. On February 1 last year, the railroad across German East Africa from Daressalam on the Indian Ocean to Kigoma, the port of Ujiji, on Lake Tanganyika was completed. It is 777 miles long and is the eastern section of the line of steam communication, partly by rail and partly by water, across tropical Africa from sea to sea. The *Bulletin* (June, p. 449) announced that the steam route across the continent had been practically completed, as the Belgians had joined the Congo with the west coast of Tanganyika by rail. A map there published shows the entire route.

The *Deutsches Kolonialblatt* (Aug. 1, 1915) prints a photograph of the *Götzen*, the first to be built of the three steamers that are intended to ply on Lake Tanganyika, connecting the German railroad from the Indian Ocean with the Belgian railroad and Congo transportation system to the Atlantic. The *Götzen* was built at Papenburg on the Ems before the war. She is 219 feet long, has a steel hull, twin propellers, cabins, dining and smoking rooms both for first and second class passengers, and large freight capacity. She was taken to pieces for shipment to Africa and piecemeal she was carried over the railroad from Daressalam to Lake Tanganyika. The railroad was of course an essential factor, for without it the material could not have been transported to the central lakes region.

While the great war has waged, skilled artisans have been assembling the pieces. There has been fighting between the British and Germans eastward toward the Indian Ocean, but the work of the ship-builders at Tanganyika has gone steadily on. The steamer was built when the material development of Africa was making mighty strides and launched last summer when African enterprise was dead; but when better times come, such ships on Lake Tanganyika will probably have all they can do, for they will complete the last link in this system of transcontinental transportation across tropical Africa. The building of the *Rechenberg*, one of the sister ships of the *Götzen*, was also completed, but she is still in Germany.

ASIA

Anthropological Research in Eastern Asia and the Peopling of America. For the extension of researches in eastern Asia, in continuation of anthropological investigations carried on in Siberia and Mongolia under the direction of the Smithsonian Institution in 1912, an allotment has been made for work during the next fiscal year and for a limited period thereafter. The plan of operations includes a thorough study of the peoples of the eastern coast of Asia, Manchuria, Mongolia, Tibet, and Siberia, among whom it is believed lies the secret of origin of the American Indian. Investigations thus far made by Dr. Hrdlička in behalf of the institution indicate, he says, "that there exist to-day over large parts of eastern Siberia and in Mongolia, Tibet, and other regions in that part of the world numerous remains which now form constituent parts of more modern tribes or nations, of a more ancient population (related in origin, perhaps, with the latest paleolithic European), which

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were physically identical with, and in all probability gave rise to, the American Indian'' (*Ann. Rept., Smithsonian Inst. 1914*, p. 17).

Dr. Hrdlička also has a paper in the *Journal of Heredity* (Vol. 6, No. 2, pp. 79-91) in which he refers to the long-disputed question of the origin of the American Indian. In the light of our present knowledge there is no accepted evidence nor any probability that man originated on this continent—a conclusion of great interest on account of Ameghino's curious contentions as to the origin of the Amerind in Argentina and foreshadowed by Hrdlička's recent book ''Early Man in South America'' (*Bur. Amer. Ethnol. Bull. 52*, Washington, 1912). Man did not reach America until after attaining a development superior to that of late Pleistocene man in Europe and after undergoing advanced and thorough stem, racial and tribal differentiation.

American natives, barring the more distantly related Eskimo, present throughout the western hemisphere many important features in common which mark them plainly as parts of one stem of humanity. Dr. Hrdlička describes the characteristic physical features of the American Indian and finds that they more closely resemble those of the great stem of the human race which, embracing several separate types and many nationalities, occupies the eastern half of the Asiatic continent and a large part of Polynesia. Circumstances point strongly to an emigration, not strictly a migration, from northeastern Asia after the glacial period, of relatively small parties, and to the peopling of America by local multiplication of more thus introduced; and these migrations were probably repeated nearly to the beginning of the historic period.

Carl Lumholtz in the East Indies. A letter received by Councilor James B. Ford from Carl Lumholtz, dated Batavia, Java, August 6, 1915, said that his plans for leaving Borneo with a party, about the middle of 1914, for exploration in Dutch New Guinea along the Digul River and among the interior islands (*Bulletin*, Vol. 46, 1914, pp. 442-443) had been defeated on account of the war. He was about ready to start when the Governor-General informed him that he could not fulfill his promise to provide facilities until after the war. The explorer then visited India, where he spent seven months, chiefly at Benares. When he wrote, he was preparing for an expedition to central Borneo, the government supplying him with a photographer, two men to collect the zoological specimens and a small escort of soldiers. His destination was the mountainous region between the two northwestern tributaries of the Barito River, which empties into the Java Sea at the city of Banjermasin. He expected to start on August 14 and to return to Batavia in February or March next, when he hopes to be able to set out on his New Guinea explorations.

Return of an Anthropological Expedition from Siberia. In June last year the Oxford University School of Anthropology and the Philadelphia University Museum sent an expedition to the northern coast of Siberia to make studies and collections among the natives. The party included Miss M. A. Czaplicka, leader, Miss Curtis, artist, Miss Haviland, ornithologist, and Mr. Hull of Philadelphia, ethnologist. The party descended the Yenisei River to its mouth. The first tribe visited was the Samoyeds, and the winter was spent among the Tungus of the tundra, a very primitive race little influenced by Russian culture. The spring was devoted to the Tatars, who are much more civilized than either the Samoyeds or Tungus. Much information of scientific interest was acquired and a large collection of costumes, weapons, implements and ornaments of copper and iron was made. It is expected to exhibit the collection in Europe and America after the war (*Nature*, Sept. 16, 1915).

EUROPE

Aërological Work in Holland. During the year 1914, under the auspices of the Meteorological Institute of the Netherlands, free air data were obtained by means of kites, pilot balloons, captive balloons and *ballons-sondes* carrying self-recording instruments. The mean altitudes reached averaged higher than in the preceding year. Some of the difficulties met with in carry-

ing on work of this character in Holland are suggested by the note that the balloons several times fell into the Zuyder Zee. The effect of the war is seen in the fact that the materials necessary for balloon construction were very hard to secure. The mean maximum altitude of visibility of the pilot balloons was over 4,000 meters, which is a good record for a climate like that of Holland. The greatest altitude was over 12 kilometers. The results of all the ascents have been published in full, in tabular form, but unfortunately there is no discussion of the data (*Ergebnisse Aerologischer Beobachtungen*, K. Nederlandsch. Meteorol. Inst., Utrecht, 1915). R. DEC. WARD.

In Honor of Captain Cook. In commemoration of Captain Cook a tablet has been placed on the school at Great Ayton, Cleveland, Yorkshire, where the navigator received his education; a scholarship has also been established at Marton, in the same neighborhood, which was Captain Cook's birthplace. The cost of both has been provided out of the surplus of the fund raised for the erection of the Cook memorial in London (*Nature*, Sept. 9, 1915, p. 47).

POLAR

The Norwegian Whaling Industry in 1913. The Norwegian whaling industry reports improved circumstances for 1913 (*Diplomatic and Consular Reports, Annual Series No. 5464*, Sept., 1915). The output of oil and guano was increased, being valued at about £2,000,000, and the creation of a mutual insurance association and other coöperative institutions among the companies helped to place the industry on a more satisfactory basis. The northern grounds, from the Shetlands and Iceland to Spitzbergen, yielded an insignificant fraction of the production, only 19,122 barrels of oil out of a total of 595,000. A period of rest is required before the restocking of the waters will again render the industry remunerative. In the southern grounds, the South Georgia and South Shetland areas each afforded over 200,000 barrels of oil, derived mainly from the larger, or blue, and the fin whales. The humpback whale, the important catch of previous years, is diminishing in numbers. The improved returns from the south are a result of increased efficiency in the outfit, both in boats and in oil-reducing machinery. The number of land stations has been increased, and in Norway itself two new companies have erected works for the refining of all kinds of fish oil, especially whale, seal and herring oils.

ARCTIC

Return of the Sverdrup and Vilkitski Expeditions. The daily press announced in October that both the Sverdrup and Vilkitski expeditions had returned safely to Europe. The two parties in their three ships reached Archangel in the middle of September. Commander Sverdrup left Christiania on July 15, 1914, at the request of the Russian government, with the object of seeking for traces of the Russian expeditions under Brussiloff and Rusanoff which had been lost in the Polar regions (*Bulletin*, Jan., 1915, pp. 53-54; April, 1915, p. 287). Sverdrup wintered in the western portion of the Taimyr Peninsula and engaged in exploration work during the winter of 1914-1915 but found no traces of the missing Russians. Commander Vilkitski has been successful in making the continuous voyage from Vladivostok to Archangel along the north coast of Siberia and this without the loss of any member of his crew. He is the second to make the Northeast Passage, Baron Nordenskjöld having been the first to accomplish this journey, along the northern coast of Asia, in 1878-1879. No details are as yet available with regard to these notable voyages of Sverdrup and Vilkitski.

Position of the North Magnetic Pole. In a letter to the editor of *Terrestrial Magnetism and Atmospheric Electricity* (June, 1915, p. 75) the late Dr. Aksel S. Steen, under whose direction the magnetic observations made by Amundsen on his Northwest Passage expedition were being worked out, says that it will not be possible to give a definite position for the north magnetic

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pole, because the pole, in his opinion, is not a point lying in a certain latitude and longitude, but must be defined as that point of the earth's surface where the horizontal intensity at the moment is zero. It is probable that Amundsen's observations will show that the point so defined has a mean daily and yearly periodic motion and, besides, also more or less irregular displacements. Perhaps it will be possible to find a mean position of the pole or the form and dimensions of a closed curve within which the pole always is to be found.

PHYSICAL GEOGRAPHY

An Argument Against Glacial Erosion. Professor Romer of the University of Lemberg has studied glacially sculptured forms for many years, especially in the High Tatra district of the Carpathians and in the Swiss Alps. In his discussion (*Kosmos*, Vol. 34, 1909, pp. 239-262), he comes to the conclusion that the essential features of scenery are due to the work of running water, but that there is some modification by the glacial ice. The paper is written in Polish, but has a summary in German.

He interprets as evidence to support his conclusion (a) the position of the present glacier tongue of the Mer de Glace outside the great trough of the Rhone valley, (b) the lack of stony material in glaciated valleys, as near the Rhone Glacier, and (c) the scarcity of ground moraine on surfaces laid bare by glacier retreat in contrast to the strong development of lateral moraines.

In the Carpathians, Romer believes the forms ascribed by others to glacial erosion are best explained by subglacial water erosion, as near the headwaters of the River Theiss. In that valley Romer describes the well-developed stream channels which carry hardly any water at the present time. Their borders touch both rims of the glacial trough and, in Romer's opinion, unless the valley has been developed under the glacier the valley walls would show clear evidence of having been notably modified by post-glacial erosion and sapping. He believes that subglacial waters deepen valley troughs and that the ice merely polishes and planes off the ledges. Romer acknowledges that glacial erosion does produce cirques and the lake basins at the headwaters of mountain streams. He recognizes that glaciers also change the direction of streams, that they do an enormous work of transportation, and that they protect and preserve valley forms produced by stream erosion. Lastly he recalls the great steps in the longitudinal profiles of main valleys in whose formation he is satisfied that stream erosion may be excluded. Romer does not understand exactly how they were formed by glacial erosion, however, and brings up the possibility of "epirogenic rejuvenation," presumably faulting or warping, for these steps. The fatal weaknesses of this theory were established by Davis in a classic essay, entitled "Sculpture of Mountains by Glaciers," in the *Scottish Geographical Magazine* for February, 1906.

As a whole the paper seems to take a position midway between that of those who deny glacial erosion absolutely and those who accept it for some phenomena, but not for all. LAWRENCE MARTIN.

METEOROLOGY AND CLIMATOLOGY

Sunspots and Temperature. In connection with his study of the correlation in seasonal variations of weather, Dr. Gilbert T. Walker, Director-General of Indian Observatories, has recently published a monograph on "Sunspots and Temperature" (*Mem. Indian Met. Dept.*, Vol. 21, Pt. 11, 1915). The subject is one to which much attention has already been paid. Köppen's pioneer work in this connection is well known. Recently an important publication by J. Mielke (*Archiv der Deutschen Seewarte*, Vol. 36, No. 3, 1913), which is in some respects a continuation of Köppen's earlier work, stimulated Köppen to renew his own investigation (*Met. Zeitsch.*, Vol. 31, 1914). The latter have already been reviewed in the *Bulletin* (Vol. 47, 1915, pp. 184-189). Dr. Walker has given his results as correlation coefficients, not as curves of sunspots and temperature. He has plotted the correlation co-

efficients on an outline map of the world to the nearest .05. Areas of positive coefficients are shaded, but are to be regarded as "rough and preliminary." It is suggested that the fall in temperature in tropical regions at times of maximum sunspots may be explained if the increase in wind, due to increased solar radiation, were to bring enough increase of cloud, humidity and rainfall over the lands to lower their temperatures. This might be true for the ground level, but up aloft the air should be warmer. If this be a correct explanation, tropical and semi-tropical places, where a rise, or at least a diminished fall, of temperature might be looked for, would be in large deserts, beyond the reach of inflowing damp air, and possibly over islands, where the air is always so damp that no increase in humidity would markedly effect the temperature. A new feature which comes out in Dr. Walker's work is the tendency towards higher temperatures in the Eurasian polar regions at times of sunspot maxima.

R. DEC. WARD.

General Circulation of the Atmosphere. Professor W. H. Hobbs, in a recent paper ("The Role of the Glacial Anticyclone in the Air Circulation of the Globe," *Proc. Amer. Philos. Soc.*, No. 218, Vol. 54, 1915, pp. 185-225), has made a noteworthy contribution to the theory of the general circulation of the atmosphere. With the large supply of new material from the various polar expeditions he substantiates his theory of the glacial anticyclone, propounded first several years ago. The old circumpolar-whirl idea needs considerable revision to bring it into accord with the observed facts of air circulation in the polar regions. The determining factor in this circulation is the location of the great continental glaciers; latitude is only indirectly concerned. Many features of the winds, character of the snow, and temperature changes indicate that fixed anticyclones exist over the Antarctic and Greenland ice domes.

Most significant is the centrifugal flow of the surface air currents above the inland ice masses, a flow prevailingly down slope, though deviated by the earth's rotation. Wind and slope observations indicate that both the Greenland and Antarctic ice sheets have more than one ice center and anticyclone. The winds on the central flat regions are generally light and variable, but increase in velocity towards the margins, where they attain great violence. The more or less constant outward sweep of the winds carries much of the inland snow into the sea. Mawson reports, "For months the drifting snow never ceased." Even with relatively high temperatures the snow in the air remains powdery in structure, indicating its drifting character.

The upper currents stream towards the anticyclonic centers, carrying with them cirriform clouds, which apparently evaporate in the down-flowing air near the center. The moisture from these clouds is evidently the source of the inland snow. Furthermore, the air in the central regions has been described both in Antarctica and Greenland as exceedingly damp. The precipitation of this moisture normally occurs in the form of ice needles near the surface without the intermediate formation of clouds.

The temperature of the lower air closely depends on that of the ice. During periods of calm the rapid radiation of heat to the ice cools the atmosphere to a considerable height. Under the influence of gravity this cold air tends to flow down the slopes, giving rise to the blizzards of the margins. With the downward acceleration of the wind the rate of adiabatic warming increases and ultimately exceeds the rate of cooling by radiation. This warming automatically stops the blizzard, and another calm period sets in during which the cold air again accumulates. Such is the apparent mechanism of much of the weather on the margins of Greenland and Antarctica.

The great strength of these permanent anticyclones is obvious from the rarity (if ever) with which any cyclone passes over Greenland and by the extension of the southerly winds to a distance of 200 miles seaward from the ice margin of Wilkes Land. Associated with the anticyclones are the permanent cyclones southeast, south and west of Greenland and in the Weddell and perhaps the Ross Seas. Thus it is evident that the general circulation of the atmosphere in high latitudes is complex and is determined primarily by the location of ice domes and the neighboring open seas. CHARLES F. BROOKS.

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HISTORICAL GEOGRAPHY

Blaeu's World Map of 1605. This map, one of Blaeu's earliest and most important works, has recently been reprinted by the Hispanic Society of America as No. 85 in the series of its publications. The reproduction is one of many undertaken by Dr. E. L. Stevenson and is an excellent facsimile of the unique copy belonging to the Hispanic Society. The map is particularly interesting by reason of its age and the character and fullness of its records. As a source of geographical knowledge of its time, its value is perhaps unsurpassed by any other map. It is printed on eighteen sheets of a fine grade of Van Gelder hand-made paper and is accompanied by an explanatory text which contains a partial list of the great Dutch cartographer's productions. Our Society's facsimile of this map has been suitably framed and now hangs in the Exhibition Hall.

GENERAL

Major Lyons' Address at the Meeting of the British Association. In the course of his Presidential address before the Geographical Section of the British Association at the Manchester meeting this year, Major H. G. Lyons said that to see what advance has been made in the scientific study of geography in Great Britain in the past twenty-five years, study must be given to the results attained by geographical investigators who have made detailed studies of various phenomena and particular regions. "If we do so I think we must admit that the number of original investigators in scientific geography who are extending its scope in this way is not so large as it might be, nor are we yet utilizing sufficiently all the material which is available to us. Any one who will examine the geographical material which has been published will find that purely descriptive treatment still far outweighs the analytical treatment which alone can lead to definite advances in scientific geography. If pleasing descriptions of this or that locality are sought for, they are for the most part to be found readily in the very large amount of such material that has been and is being published each year by residents, travelers, and explorers; but if information is desired in the prosecution of a piece of geographical research, we are checked by the lack of precise details. Few of this class of descriptions are sufficiently definite to enable the necessary comparisons to be made between one locality and others which are similarly situated; thoroughly quantitative treatment is for the most part lacking, and while a pleasing picture is drawn which is probably true in character, it is usually inadequately furnished with those definite facts which the geographer requires."

Major Lyons said that in every part of the British Isles a geographer may find some geographical problem which is well worth working out and which, if thoroughly done, will be a valuable contribution to his science. He deplored the common neglect of mathematical geography. While in national surveys the determination of positions is carried on to great refinement in order to supply the necessary control for the construction of large-scale maps, most inadequate attention is usually given to the location of travelers' routes. Some important and costly expeditions have presented their results, in so far as they relate to routes followed and the position of points determined, in such a way that it is impossible to say within what precision such positions have been determined; consequently any combination of these results with those of later expeditions has to be carried out empirically.

Major Lyons expressed the opinion that the paucity of papers dealing with practical cartography and the compilation of maps is proof that this branch of the subject needs more serious attention than it now receives. He advised that technical papers of a thoroughly scientific character should be presented to small meetings of other workers in the same or allied fields where they might be completely criticized. The reading, discussion and publication of such papers are for geographers a great desideratum, for it is in them and by them that all new advance in the subject is made. He inquires if the exposition of a regional study impresses sufficiently upon the student the necessity of personal research in the details of a problem in such a way as to gain a real working acquaintance with it.

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Major Lyons' paper is so admirable in the originality and good judgment it displays that few objections can be raised against it. But a goodly number of geographers will hardly have his attitude towards regional studies and exploration. It is quite true, as Major Lyons contends, that there is a great quantity of unorganized material but the organization requires something more than office research. Modern geography, with its strong human element, was not generally recognized as a science until a few years ago. Much of the field work before that time resulted in reports and monographs deficient in essential facts and principles. It follows that the modern geographer not uncommonly secures more reliable material in a year of field work than he could gather in five years of work on the uncritical, formless observations of untrained observers. Nor must we overlook the formative effect upon the mind of scientific observations in new fields. The profound influence which exploration may exert upon young men is well illustrated in the classic examples of Darwin and Dana. Had they waited for the complete mastery of the known principles of their time both would have lost, not only in that power of analysis, but also in that power of discovery of new principles which to a high degree are outgrowths of the search for truth through the medium of first-hand observation.

PERSONAL

Dr. J. Scott Keltie, late Secretary of the Royal Geographical Society, has received the gold medal of the Scottish Geographical Society in recognition of his services to geographical science.

The Livingstone gold medal of the Scottish Geographical Society has been awarded to Lord Kitchener for his work on the survey of Palestine and as director of the survey of Cyprus as well as for his services to the state.

Joseph Bradfield Thoburn, who has had charge of the ethnological work at the University of Oklahoma, is on leave of absence preparing a history of the state.

OBITUARY

Professor FREDERICK WARD PUTNAM, the distinguished anthropologist and naturalist, died on August 14 in his seventy-seventh year. He was honorary curator of the Peabody Museum at Harvard University. His untiring energy was for many years devoted not only to ethnological research but also to the Museum's development.

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GEOGRAPHICAL LITERATURE AND MAPS

(INCLUDING ACCESSIONS TO THE LIBRARY)

BOOK REVIEWS AND NOTICES

(The size of books is given in inches to the nearest half inch)

ASIA

The Excavations at Babylon. By Robert Koldewey. Translated by Agnes S. Johns. xix and 335 pp. Ills., index. The Macmillan Co., New York, 1914. $5.25. 9½ x 6½.

This volume contains the official record of the German excavations at Babylon from 1889 to the date of writing.

In these mounds as elsewhere in Mesopotamia the accumulated strata indicate successive dynastic occupations.. Thus in Merkes, the mound which probably covers the residential and business section of the city, the upper strata represent the Græco-Parthian periods, those lower down, the Persian, Neo-Babylonian, Assyrian, and Babylonian. The lowest accessible stratum contained tablets of the immediate successors of Hammurabi (2250 B. C.). Below this the water level stopped further progress, so that it was impossible to reach either virgin soil or a remote antiquity as at Nippur and Bismya.

The most important structures so far uncovered belong to the restoration of the city under the Neo-Babylonian kings. In the *kasr* or *"acropolis"* these are the Procession Street of Marduk, the Ishtar Gate, to which it forms the approach, the Temple of Emach, and the great Southern Citadel. Here also is the palace which Nebuchadnezzar describes in the Grotefend cylinder as the seat of his government, containing three large courts and the throne room—the probable scene of Belshazzar's feast! Another section of this palace from certain peculiarities of structure which correspond with descriptions of Berosus and Diodorus, Koldewey has identified with the hanging gardens.

South of the *kasr*, lies the *peribolos* of Etemananki, containing the sacred treasuries, the priests' quarters, and the tower or *ziggurat*. The latter had been previously destroyed by brick-robbers. Close by is the Esagila, the temple of Marduk, the patron of Babylon. Its plan is similar to that of Emach, with the addition of *cellæ* for other gods. Excavations here are still incomplete. In front of this temple group are the remains of the bridge across the Euphrates described by Nebuchadnezzar in the Eulla cylinder. Seven boat-shaped piers are left.

In the light thrown upon Babylonian architecture and in the identification of buildings already known by reference in contemporary inscriptions, the value of these excavations is exceedingly great. The usual variety of pottery, metal and glass objects, terra-cottas, and coffins were found, but nothing of new or unusual interest, nor have the tablets as here recorded yielded anything of especial literary merit.

The plates and illustrations are excellent, and the style clear and readable.

ELLEN SETON OGDEN.

Mesopotamian Archæology. An Introduction to the Archæology of Babylonia and Assyria. By Percy S. P. Handcock. xvi and 423 pp. Ills., index. G. P. Putnam's Sons, New York, 1912. $3.50. 9 x 6.

The present book offers scholars a welcome résumé of what has been accomplished in the field of Babylonian research since its inception in 1811. The author's knowledge of his subject is exact and accurate and his handling

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of the vast amount of material at his disposal is marked by singular clearness and power of condensation. To the more casual reader the volume commends itself by a clear-cut crispness of style and presentation which renders even such an amassment of detail as this devoid of all tedium.

The introduction, which, together with a short account of the soil, vegetation, and animals of the Tigris-Euphrates Valley, contains an excellent historical sketch of its successive civilizations, is followed by the story of the various excavations since Botta began in 1842, and also of the first attempts at decipherment. The next two chapters, from an archæological point of view perhaps the most important in the book, have to do with architecture and sculpture. Under the former heading the temples, *ziggurats*, palaces and private houses which have been laid bare up to the present are fully and ably treated with due regard to all the architectural details. Under sculpture both the more customary bas-relief and the less frequent as well as less successful statute in the round are admirably discussed. The treatment of metallurgy, an art in which the Mesopotamian peoples excelled, is equally good. The remaining chapters are necessarily more heterogeneous in content, dealing with cylinder seals, figurines, painting, stoneware and pottery, dress, military accoutrement, customs, and so on, but they are valuable as the first complete attempt to classify the findings of Babylonian excavations under the usual subject-headings of archæology. ELLEN SETON OGDEN.

EUROPE

The New Map of Europe (1911–1914). The story of the recent European diplomatic crises and wars and of Europe's present catastrophe. By Herbert Adams Gibbons, Ph.D. xii and 412 pp. Maps. The Century Co., New York, 1914. $2. 5½ x 8½.

A splendid marshaling of the events preceding the present war. In spite of the book's somewhat inappropriate title the author has not hesitated to lure his readers on as far as Persia or Morocco to probe causes underlying European conflicts. Chapters dealing with the Balkans are specially attractive. Mr. Gibbons's residence in the land, that is always on the *qui vive*, situated, as it is, on the eastern margin of the European political chess-board, well fits him to instruct his countrymen.

Staffordshire. By W. Bernard Smith. (Series: Cambridge County Geographies.) xi and 155 pp. Maps, diagrams, ills. University Press, Cambridge. G. P. Putnam's Sons, New York, 1915. 40 cts. 5 x 7½.

The volume carries out its theme along evolutionary and developmental lines that cannot fail to interest the student. The photographic illustrations are pleasing, though some, of architectural value only, might advantageously be replaced by additional maps and diagrams (*e. g.* of density of population) showing this inland county's communications with the rest of the country and its climate in greater detail.

Our Common Sea-Birds. Cormorants, Terns, Gulls, Skuas, Petrels and Auks. By Percy R. Lowe. xvi and 310 pp. Map, ills., index. "Country Life," Ltd., London, 1914. 15s. 11½ x 9.

This is the first of two volumes dealing with the common sea birds of the British Isles and adjacent regions. It is written especially for the layman, and in simple, delightful English. It tries to acquaint those interested in the birds that frequent the seashore, with something of their habits, classification, nests, eggs and migrations.

Many splendid photographs illustrate the flight of sea birds. The cormorants, terns and gulls are most comprehensively treated from the standpoint of natural history, occurrence, migrations, feeding and nesting habits. The habitat photos of the terns are especially fine.

Concerning a group of gulls called the skuas the author says, "the skuas are bold and powerful birds, gifted with splendid powers of flight, which

they put to good use in making their weaker cousins—the gulls and terns—disgorge their already swallowed food, which is caught on its fall by the skuas before it has reached the water. Thus, while it is not scientifically correct to say so, the skuas are commonly termed a parasitic race of birds.'' These birds live like pirates on the proceeds of their violence.

The petrels, shearwaters, auks, guillemots and puffins are also treated. The book is distinguished not alone by numerous and superb illustrations that rival the work of Chapman, but by beauty of thought and style. It is a valuable contribution to bird literature. R. W. SHARPE.

Das deutsche Helgoland. Von Dr. E. Lindemann. xv and 271 pp. Maps, ills., index. Vita, Deutsches Verlagshaus, Berlin-Charlottenburg, 1913. Mk. 8.50. 10 x 7½.

Dr. Lindemann was physician of the island for eight years in the latter part of the English occupancy, and in 1889 wrote a book, ''The North Sea Island, Helgoland.'' It reappears in the present volume, rewritten on occasion of the twenty-fifth year jubilee of Emperor William, to whom ''it is exclusively due that the island, in the veins of whose inhabitants German blood flows, is again under German lordship.'' The volume is very readable and full of interesting information. With the ''Dune,'' Helgoland does not measure quite a quarter of a square mile. New harbor works have added about fifty acres to this by sand-filling between walls. So the island is larger than when taken over from the English. The Germans have greatly diminished the wearing away of the cliffs in two ways: by a protecting wall at the southwest end, which is now being extended along the whole west side; and by impregnating the cliff-rock with ''a solution of feldspar and quartz'' where it was weathering badly. The island, it is now believed, is assured for tens of thousands of years to come.

Helgoland was long in the hands of the dukes of Schleswig-Holstein, from whom the Danes took it in 1684. England took it from the Danes in 1807 as a measure against Napoleon's control of the Continent, and ceded it to Germany in 1890 to buy off that power's clever annexation of Zanzibar. The people are Frisians, number 2,500, a very dense population indeed, have a low death rate, but a birth rate lower even than that of France. This may be due to the intermarriages formerly prevalent, about forty natives to one outsider in 1890. Among the many good things that are said to have come of the German rule are more marriages with natives of the mainland. It is the sea baths that bring the visitors, 35,000 of them in 1911 to 13,000 in 1890. These visitors are the main support of the islanders. All the pictures illustrate admirably. Those of the island men are strikingly English in type. There are maps showing the changes in the coast. MARK JEFFERSON.

Die geographischen Grundlagen der Österreichisch-Ungarischen Monarchie und ihrer Aussenpolitik. Von Robert Sieger. 54 pp. (Reprint *Geogr. Zeitschr.*, Vol. 21.) B. G. Teubner, Leipzig, 1915. Mk. 1. 10 x 7.

This essay, written in November, 1914, was published serially from January to March, 1915, in the *Geographische Zeitschrift* and is now reprinted in complete form.

Some geographers regard the empire as owing its existence not to geographical but to historical conditions, especially its ancient dynasty. Others take it as an example of the state-building power of geographical factors. As supporters of the former view the author cites Sven Hedin, Neumann, Philippson, Sievers, Hettner and Kjellen. For the latter Supan, Grund, Heiderich, Springer, Penck and Krebs are named. Surprise is expressed that Austrian views have had so little notice, but the author is aware that these views have been attributed to patriotic prejudice.

Great orographic and climatic diversity is recognized. The central land is of course the Danube valley. However, its parts are in diverse degree open to the river and to each other. But, ''in contempt of watersheds,'' much of the Empire lies in other river basins. These parts, however, are often units in themselves, combined in the greater unity of the whole.

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Of present interest is the author's naïve story of the addition of the border lands, since the beginning of the eighteenth century, at which date the dual empire had essentially natural boundaries. In addition to "purely political and military events," speech, faith and culture came into play and highways of trade added their bond. Movement took place toward Italy to secure the southern outlets of the Alps. North of the Carpathians organic connection is not claimed, but military and political necessity and the petroleum fields are the avowed motives. Similar considerations are at hand to explain the acquirement of Bosnia and Herzegovina.

Racial and confessional groupings receive considerable discussion, together with domestic and foreign politics and the industrial life. The historic mission of the empire is that of a border watchman and bearer of western culture. The league between Germany and Austria-Hungary is based on central positions, neighborly contact and common exposure to the Russian. The desire to construct a geographical basis is plain from the following: "The picture of geographic inclosure which showed us the unity of the central lands is in no way marred by the added border lands, and the monarchy can appeal to good geographic foundations for its present boundaries." The essay as a whole is somewhat discounted by the appearance of special pleading in view of present conditions. It is the old cry against Panslavism, accented by current feelings and events. A. P. BRIGHAM.

L'Adriatico: Studio geografico. storico e politico. By [* * *]. 404 pp. Fratelli Treves, Milan, 1915. 6½ x 10.

An anonymous patriot presents here arguments in favor of Italian sovereignty over the Adriatic's east coast. His idea is largely based on geographical and historical considerations; and his discussion is lightened by touches of the romantic history of the ancient coastlands or by absorbing descriptions of their present state. In one respect the author is, perhaps, too sanguine. The establishment of Italian trade relations with the Balkan Peninsula does not so much imply conquest of the Adriatic as it demands surmounting the Dinaric mountain obstruction. Furthermore, as a channel of Balkan trade, the Adriatic has never competed with the Danube and it is doubtful if it ever will.

The numerical preponderance of Slavs in Dalmatia fails to disturb the writer's views on national expansion. To him a whole chain of imposing ruins along the scenic coast bears witness of Roman splendor. Trade is almost entirely in Italian hands. He might well have added that Roman law governs the land. Upon these elements Italian influence in the region rests paramount at present. Its maintenance is advocated with fair appreciation of Slav interests. The reader will be impressed by the open-mindedness of the whole work.

The Russian Problem. By Paul Vinogradoff. 44 pp. G. H. Doran, New York, 1915. 75 cents. 9 x 5½.

The author divides his book into two parts: the first, entitled, "Russia After the War"; the second, "Russia, The Psychology of a Nation."

Vinogradoff considers the geographical principle, as applied to Europe, that "social progress starts from countries with a well-differentiated seaboard and gradually spreads to the more massive continental blocks." He continues: "Eventually these blocks of hinterland may prove more fertile and rich in culture than the tracts which have assumed the initiative; but it is in river deltas, in peninsulas, and in islands that the movement of civilization originates."

The economic condition of the farming class in Russia is discussed; and it is pointed out that the Russian farmers already are forming coöperative societies. But there are several factors which act against the farmer. Among these things which ought to be remedied are: police interference, which should be removed; a poor law to help the poor; credit, to aid the farmer and other industries; the masses should be educated. There is also needed a reform in the manner of election of the House of Lords—the Council of the Empire; a betterment in the civil service; and a firm Habeas Corpus Act. W. G. B.

Die Schweiz. Land, Volk, Staat und Wirtschaft. Von Oscar Wettstein. (Series: Aus Natur und Geisteswelt.) vi and 114 pp. Map. B. G. Teubner, Leipzig, 1915. Mk. 1.25. 7½ x 5.

A large subject, treated in a small book, conformable to the plan of this well-known series. One does not question the sincerity of the author, in observing that the abundant material would make it easier to put it into seven volumes than into seven chapters. Comprehensiveness is not surrendered, however, and there is, in spite of narrow limits, surprising fullness of information about the land, the people, the history, civil government, industrial conditions and material and intellectual development. The preface, written in October, 1914, expresses the hope of continued neutrality, calls the country an oasis of peace in the heart of Europe, and points to the Swiss as possible healers and mediators in coming days. A. P. BRIGHAM.

POLAR

The Home of the Blizzard. Being the Story of the Australasian Antarctic Expedition, 1911-1914. By Sir Douglas Mawson. Vol. 1: xxx and 349 pp. Vol. 2: xiii and 338 pp. Maps, ills., index. J. B. Lippincott Co., Philadelphia, 1915. $9 per set. 10 x 7½.

This expedition to Antarctica under the command of Sir Douglas Mawson, and financed largely by the people of Australia, returned in 1914, after more than two years of work, with a superb record of achievement. The arrangements and personnel of the expedition were unusually well provided for and the object of the expedition, primarily to explore the unknown coast between Cape Adare and Gaussberg, was a sufficient departure from the ordinary aim in high latitude exploration to make the expedition of special interest. Mawson's report of the area known as Wilkes Land is particularly gratifying to Americans in that he gives full credit to Wilkes for his voyage and discoveries along hundreds of miles of the coast line, which his countrymen named Wilkes Land in his honor.

This work is the greatest contribution to Antarctic literature of recent years because it deals with about one-seventh of the periphery of the Antarctic coasts that were entirely unknown except for the memorable voyage of Wilkes in 1840 and the scientific work of the *Gauss* German expedition in 1902. It is needless here to set forth the content of the brilliant work of Mawson and his party because their results and experiences have been described in all geographical periodicals as well as in many other publications. Mawson's volumes are needed in all public and geographical libraries and in the collections of all persons who are interested in Polar exploration. Besides being a complete record of the journeys, the discoveries and the scientific conclusions of the Mawson party, the volumes also have in a high degree the fine quality of readability; and their maps and illustrations are unsurpassed in any polar book.
R. M. BROWN.

Report on the Scientific Results of the Voyage of the S. Y. "Scotia" during the years 1902, 1903, and 1904, under the leadership of William S. Bruce (Scottish National Antarctic Expedition). Vol. 4: Zoology. Parts 2-20: Vertebrates. By D. Hepburn, and others. 505 pp. Maps, ills. Scottish Oceanogr. Laboratory, Edinburgh, 1915. 50s. 12½ x 10.

To the geographer the most direct interest of the fourth volume of the above report lies in the section entitled "The Whale Fisheries of the Falkland Islands and Dependencies," by Theodore Salvesen. The report gives a condensed account of the rise of modern whaling in the Southern Seas. From its commencement in the early eighteenth century the old industry rose to a period of maximum prosperity in the first half of the nineteenth century, when the southern waters were annually frequented by 500 or 600 whalers. The whalers were wooden sailing vessels of 150 to 400 tons, complete in themselves for the prosecution of the industry from start to finish. But they were restricted in their range and, with a reduction in catch and in the value of whale products,

were gradually eliminated. The steam-whaler, introduced in 1866, changed the character of the industry. Increased speed and size enable the new whaler to augment his catch by the addition of the finner species, from which he had been debarred under the old methods. The new method was first applied in the Antarctic waters by a Buenos Aires company, acting on the initiative of a Norwegian sea captain who had visited the region with Nordenskiöld's expedition. In 1904 this company started operations from a base in the island of South Georgia. During the last season for which records are attainable, November, 1912, to April, 1913, the total production for the Falkland Islands and dependencies is estimated at 430,000 barrels of oil and 8,375 tons of guano. The industry gave employment to 3,500 men.

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Selling Latin America. A Problem in International Salesmanship. What to sell and how to sell it. By William E. Aughinbaugh. xi and 408 pp. Maps, ills., index. Small, Maynard & Co., Boston, 1915. $2. 8½ x 5½.

Of the 29 chapters, 18 discuss the economic geography of the various Latin-American republics. The remaining chapters treat practical problems of interest especially to those who need information concerning specific ways and means of extending foreign commerce with Latin-America. Among the topics discussed are the salesman and the customer, custom-houses and tariffs, trade marks, finance and credit, packing and shipping, advertising, and health precautions. There is also a chapter on the development of European trade with Latin-America, with emphasis upon Germany's method of attacking the problem. Four small maps are helpful. AVARD L. BISHOP.

Pioneers in Tropical America. By Sir Harry Johnston. (Series: Pioneers of Empire). 320 pp. Ills. Dodge Publishing Co., New York, 1915 [?]. $1.50. 8½ x 6½.

The "Pioneers of Empire" is a series of "real adventures" written with the aim of acquainting the youthful reader with the origins of the British Empire over the seas. This volume, after preliminary chapters on the Spanish pioneers in the New World, relates the exploits of Drake, Raleigh and Dampier in detail and more briefly the doings of other captains, not a few of them pirates, of the sixteenth and seventeenth centuries. The book contains a short bibliography and some attractive colored illustrations.

America, including Canada, Newfoundland, the British West Indies, and the Falkland Islands and Dependencies. The Oxford Survey of the British Empire, edited by A. J. Herbertson and O. J. R. Howarth: Vol. IV. 511 pp. Maps, ills., index. Clarendon Press, Oxford, 1914. 14s. 9 x 6.

The authors have done much to overcome the difficulty of treating geographically so varied a bundle of scraps as British America. They succeed best with Canada, as the largest continuous land mass. Yet the geology, physiography and geography of Canada, too, are in almost every province the continuance of those of North America, *i. e.* Canada's physical provinces are parts of continental ones. Settled Canada is essentially a fringe along the northern border of the United States, completely interrupted where Lake Superior forms the boundary. Such a view is held neither in Canada nor in this book, but it is recognizable in the treatment of the West.

Among the stronger features of the work are Coleman's account of the physical features of Canada; and, above all, Prof. James Mavor's economic survey of Canada. This is admirable. If it reminds one of Ratzel's chapters on the social conditions of the United States in the "Vereinigten Staaten von Nord Amerika," it is more sympathetic and appreciative than Ratzel's, although much briefer. We are glad to learn that Mavor has made fuller reports to the government.

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Interest will attach to Dr. Grenfell's chapter on Labrador from the fame of his work among the coast dwellers. As a geographer he has less distinction. We note here his expressed hope that economic salvation may be found for the people in great herds of reindeer. The pages on Labrador draw particular attention to the maps of the volume for their complete failure to illustrate the text. Most of the places or earth features that Dr. Grenfell names are either not named on the map or have other names than he uses. In less degree the same remark applies to the names used by Coleman. The maps appear to have been prepared for the work quite independently of the text, as is the very bad practice of most publishing houses. A list of places referred to in a text ought to be in the draughtsman's hands from the very moment he begins to lay out his map. The pictures are a delight. They are unusually fine, abundant enough, and they illustrate the book.

Roger's account of Newfoundland brings out clearly the distribution of its people in a great number of hamlets and a few towns along the ragged coast, close to the sea that supports them.

The West Indies, we learn, are recovering from the long economic stagnation that dates back to the abolition of slavery and the later development of beet-sugar production in Europe. Most of the pages on the tropics were written by Sir Daniel Morris, late commissioner of agriculture for the islands. He reports such success for his commission, "the first effort of the kind in the tropics," that others have been established in British tropical lands. Sugar production has been revived, cacao planting expanded, the banana exportation of Jamaica enormously increased, and sea-island cotton is now being exported from the West Indies to the value of $1,000,000 a year, at 32 cents a pound. The physiography of the islands is not satisfying. Surely Nevis, and still more St. Kitts, have a coastal plain! Basse Terre stands on it, and what is Monkey Mount but an emerged coral reef? And would it not be safer to say that St. Pierre was destroyed by a steam blast than by "an avalanche of incandescent ash?"

Geographically, of course Guadeloupe and Martinique are hard to spare from a treatment of the islands. The very contrast of the tastefully dressed colored people in the French islands and their striking dwellings with the less attractive appearance of the same people in the English islands is worth going to see. The book is a useful volume full of geographical matter.

MARK JEFFERSON.

The Holy War "Made in Germany." By Dr. C. Snouck Hurgronje. xvi and 82 pp. G. P. Putnam's Sons, New York, 1915. 7½ x 5.

Richard Gottheil, in the introduction, pays tribute to the author as one of the few who are able to discuss Islamic questions, a competency based on residence in Mecca and in Batavia and on wide acquaintance with men of this faith. Appearing first in a Dutch periodical, the essay has been translated by Professor Joseph E. Gillet of the University of Wisconsin.

The author takes as a key to his discussion the view of an intellectual Turk, that this is the day of freedom of belief, wars now being waged for economic and political ends, and with increasing destructiveness due to technical progress. This view does not seem to harmonize with Mohammedan prescriptions toward other religions, involving *holy war* for subjecting the whole world to the rule of the faith. Here is presupposed one man's leadership, but Islam has really disintegrated, and more than 90 per cent. of it is under European sovereignty, while Turkey itself keeps, by "balancing," the mere appearance of independence.

This great change has been due to the economic expansion of Europe. World dominion founded on his religion attracts only the ignorant Mohammedan and others are ashamed of the *jihad* and urge that its day is past.

Speaking as a Dutchman for the East Indian Archipelago, the author declares it immune to this "politico-religious mixture of deceit and nonsense," and he puts against the "*conscious Islam-policy*" of Germany a conscious educational policy and the century-old guarantee of religious liberty.

A. P. BRIGHAM.

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Wild Life Across the World. Written and illustrated by Cherry Kearton. Introduction by Theodore Roosevelt. xxvii and 286 pp. Ills., index. Hodder & Stoughton, New York, 1914(?). 20s. 10 x 7½.

The story of a photographer and naturalist in the pursuit of wild life in natural habitats. The book covers adventures in Borneo, India, Africa, Canada and the United States. The patience, hardihood and danger in the quest can easily be read between the lines but Kearton also gives a series of pictures and a tale of adventure which will delight alike the student of wild animal life and the lover of excitement. He also records many facts of the habits of the animals he has studied. ROBERT M. BROWN.

OTHER BOOKS RECEIVED

These notes do not preclude more extended reference later

NORTH AMERICA

CROSSING THE PLAINS [IN THE] DAYS OF '57. A narrative of early emigrant travel to California by the ox-team method. By Wm. Audley Maxwell. 179 pp. Ills. Sunset Publishing House, San Francisco, 1915. 50 cents. 7 x 5½.

FIRST THROUGH THE GRAND CANYON. By Major John W. Powell. Being the record of the pioneer exploration of the Colorado River in 1869-70. Edited by Horace Kephart. (Series: Outing Adventure Library.) 320 pp. Outing Publishing Co., New York, 1915. $1. 7½ x 5. [The narrative part of Powell's report (Smithsonian Institution) is here republished without abridgment.]

SOUTH AMERICA

STUDY OUTLINE ON SOUTH AMERICA, PAST AND PRESENT (based on James Bryce's "South America"). Tentative edition. (Study Outline Series.) 15 pp. The H. W. Wilson Co., White Plains, N. Y. 25 cents. 7½ x 5½. [This cutline, based on Bryce's "South America," is one of a series of topics prepared for the use of clubs.]

AFRICA

LA SOMALIA ITALIANA. Di L. Oreglia di Santo Stefano. 87 pp. G. Bonis e Rossi, Torino, 1914. 9 x 6.

ASIA

THE SPELL OF THE HOLY LAND. By Archie Bell. Photographs by E. M. Newman. xvii and 371 pp. Map. The Page Co., Boston, 1915. $2.50. 8 x 6.

EUROPE

PROBLEMS OF READJUSTMENT AFTER THE WAR. By F. H. Giddings, A. B. Hart, E. R. Johnson, E. R. A. Seligman, G. G. Wilson, W. W. Willoughby and C. F. Goodrich. 186 pp. D. Appleton & Co., New York, 1915. $1. 7½ x 5½.

DIE WIRTSCHAFTLICHEN GRUNDLAGEN DER KRIEGFÜHRENDEN MÄCHTE. Von Prof. Dr. A. Oppel. (Series: Kriegsgeographische Zeitbilder, Land und Leute der Kriegsschauplätze, Herausgeber Dr. Hans Spethmann und Dr. Erwin Scheu, Heft 1). 48 pp. Veit & Co., Leipzig, 1915. 80 pfg. 9 x 6½.

LOWLAND SCOTCH AS SPOKEN IN THE LOWER STRATHEARN DISTRICT. By Sir James Wilson. 276 pp. Oxford University Press (Amer. Branch), New York, 1915. 5s. 9 x 6.

ALSACE AND LORRAINE: FROM CÆSAR TO KAISER, 58 B. C.–1871 A. D. By Ruth Putnam. viii and 208 pp. Maps. G. P. Putnam's Sons, New York, 1915. $1.25. 8 x 5½.

XUM

UNSERE MÄRKISHE HEIMAT: Eine Anthologie für Berlin und Brandenburg. Herausgegeben von Richard Nordhausen. x and 520 pp. Ills. F. Brandstetter, Liepzig, 1915 (†). Mk. 4. 8½ x 6.

POLAR

ADRIFT IN THE ARCTIC ICE PACK. From the history of the first U. S. Grinnell expedition in search of Sir John Franklin. By Elisha Kent Kane. Edited by Horace Kephart. (Series: Outing Adventure Library.) 402 pp. Outing Publishing Co., New York, 1915. $1. 7½ x 5.

GLI ESCHIMESI: La Razza, gli Usi e i Costumi, Folklore. Di A. Faustini. 204 pp. Ills., index. Fratelli Bocca, Torino, 1912. L. 3.50. 7½ x 5.

REPORT ON THE DOMINION GOVERNMENT EXPEDITION TO THE NORTHERN WATERS AND ARCTIC ARCHIPELAGO OF THE D. G. S. ARCTIC IN 1910, under command of J. E. Bernier. 161 pp. Maps, ills., index. Dept. of Marine & Fisheries, Ottawa, no date. 10 x 7.

THE VOYAGES OF CAPTAIN SCOTT. Retold from 'The Voyage of the "Discovery" ' and 'Scott's Last Expedition.' By Charles Turley. viii and 440 pp. Map, ills., index. Dodd, Mead & Co., New York, 1915. $2. 8 x 5½. [A condensation of the last two books describing Scott's Antarctic explorations; intended for boys and others who prefer narrative to scientific detail.]

THE WORLD AND PARTS OF IT

LE COLONIE ITALIANE. Elenco Alfabetico della località abitate nella "Libia (Cirenaica e tripolitania)–Eritrea–Somalia," "Isole del Dodecanneso–Rodi." Di C. Triverio. (Series: Manuali Hoepli.) 66 pp. Maps. U. Hoepli, Milan, 1915. L. 1.50. 6 x 4.

GENERAL

LEBEN UND WIRKEN AUGUST PETERMANNS. Von Dr. E. Weller. 64 pp. J. Klinkhardt, Leipzig, 1914. Mk. 2. 9½ x 6½. [An excellent summary of the life of Petermann and of his brilliant achievements as a geographer, whose influence was most effective in improving the quality of geographical periodicals and elevating the standards of cartography and of scientific exploration. Supplementary to the author's more elaborate treatment of the subject, which was reviewed in the *Bulletin*, Vol. 43, 1911, pp. 845-847.]

STORIES OF EXPLORATION AND DISCOVERY. By Arthur B. Archer. xi and 198 pp. Maps, ills., index. University Press, Cambridge, 1915. 2s. 6d. 8 x 5½.

A ASTRONOMIA DOS LUSIADAS. Por Luciano A. Pereira da Silva. xv and 229 pp. Ills. Imprensa da Universidade, Coimbra, 1915. 11 x 7.

PRACTICAL OIL GEOLOGY: The Application of Geology to Oil Field Problems. By Dorsey Hager. xii and 149 pp. Ills., index. McGraw-Hill Book Co., New York, 1915. $2. 7½ x 5.

CURRENT GEOGRAPHICAL PAPERS

NORTH AMERICA

DEARBORN, N. Silver Fox Farming in Eastern North America. 35 pp. Map, ills. *U. S. Dept. of Agric. Bull. No. 301.* Washington, 1915.

LISTENFELT, H. The Hudson's Bay Company and the Red River Trade. Bibliogr. *Collections State Hist. Soc. of North Dakota*, Vol. 4, pp. 235-337. Fargo, 1913.

United States. ALEXANDER, W. H. Distribution of Thunderstorms in the United States. *Monthly Weather Rev.*, Vol. 43, 1915, No. 7, pp. 322-340.

ANDERSON, R., AND R. W. PACK. Geology and Oil Resources of the West Border of the San Joaquin Valley North of Coalinga, California. 220 pp. Maps, ills., index. *U. S. Geol. Surv. Bull. 603.* Washington, 1915.

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MEYER, H. Inhalt und Ziele der Kolonialgeographie als Lehrfach. (Antrittsvorlesung, Universität Leipzig, 12. 6. 1915.) *Kolon. Rundschau*, 1915, No. 7-8, pp. 315-326. Berlin.

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NEW MAPS

EDITED BY THE ASSISTANT EDITOR

For system of listing maps see p. 75 of this volume

ASIA

Turkey in Asia. Die Eisenbahn-Konzessionen in der Asiatischen Türkei im Jahre 1914. Nach den Verträgen entworfen von Generalleutnant D. Imhoff, Berlin. 1:5,000,000 approx. 46° - 30° N.; 25° - 50° E. 10 colors. With inset: Fortzetzung der Hedschasbahn. 1:10,000,000. 30° - 11° N.; 32° - 47° E. 3 colors. Accompanies as Taf. 37, "Das Eisenbahnnetz der Asiatischen Türkei vor dem Kriegsausbruch" by C. Imhoff, *Petermanns Mitt.*, Vol. 61, 1915, July, pp. 264-266.

[Shows the nationality of the railroad systems in Asiatic Turkey, as fol-

lows: German (completed, under construction, projected), French (completed, projected), British (completed), Italian (projected) and Turkish (completed and projected). The full line used to indicate the projected Italian railroad is not consistent with the rest of the symbolism, in which completed railroads are shown in full, and projected railroads in broken lines. No symbol is given in the legend for projected Turkish railroads, although the category occurs on the map. For a map giving the same information, but with the additional valuable feature of giving the physical and economic background, see under "Turkey in Asia, etc.," in the January *Bulletin* (Vol. 47, 1915), p. 75.]

EUROPE

Rumania-Austria-Hungary, etc. (a) Der rumänische Volksboden und die staatliche Entwicklung des Rumänentums. Entworfen von Paul Langhans. 1:1,500,000. 48°40′ N. - 43°0′ N.; 19°40′ - 30°30′ E. 12 colors.

(b) Der rumänische Anteil an der Bevölkerung Ungarns, der Bukowina und Bessarabiens. Nach den neuesten Sprachenzählungen entworfen von Paul Langhans. Same scale and limits as (a). 33 colors.

Accompany, as Taf. 35 and 36, "Verbreitung und Entwicklung der rumänischen Nation" by F. W. P. Lehmann, *Petermanns Mitt.*, Vol. 61, 1915, July, pp. 256-259. (Taf. 35 also accompanies "Die Entwicklung des rumänischen Staatswesens" by N. Jorga, *ibid.*, pp. 260-263.)

[Map (a) is an ethnographic map showing the distribution of races within the maximum area inhabited by Rumanians. The following are thus also distinguished: Germans, Magyars, Serbs, Bulgarians, Turks, Greeks, Russians, Poles, Slovaks, and Jews. The uninhabited areas are left blank. In red are shown, in addition, the boundaries of the various territorial changes Rumania has undergone in her history. Map (b) shows, for Hungary, the Bukovina and Bessarabia, the proportion of relevant races to total population. The races shown are the Rumanians, Ruthenians, Magyars, Germans, Serbo-Croats, Slovaks and Russians. To indicate preponderance three grades in areal colorings are used for each race (90%-100%; absolute majority; relative majority), while minority is indicated by four colored symbols (over 40%; 30%-40%; 20%-30%; 10%-20%). Thus in the municipal district of Temesvar the Germans are shown to have the relative majority (greater number than any other race), while the Magyars represent 30%—40% and the Rumanians 10%—20% of the population. On map (a) distribution is geographically generalized, on map (b) it is shown by political districts.]

POLAR

Arctic

Barents Sea. Voyages de Jan Cornelisz May dans la mer de Barents en 1611 et 1612. [1:14,000,000.] [77½° - 68° N.; 12° - 73° E.] Accompanies, as Fig. 32, on p. 413, "Les voyages de Jan Cornelisz May dans l'océan Arctique, (1611-1612)" by A. Cabaton, *La Géogr.*, Vol. 29, No. 6, pp. 409-416.

WORLD AND LARGER PARTS

Indian Ocean, etc. Chart [of the Indian and S.W. Pacific Oceans] showing the drift of ocean current papers. 1:38,000,000. Commonwealth Meteorologist, [Melbourne], 1915.

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hydrographische Schul-Wandkarte nach E. v. Sydows Plan, bearbeitet von H. Habenicht. Fünfte Aufl. 1:6,000,000. Justus Perthes, Gotha, [1914?].

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Philips' comparative series of wall atlases: Australasia. Edited by J. F. Unstead and E. G. R. Taylor, with explanatory handbook for teachers. [8 maps]: 1, relief of land & communications; 2, Pacific Ocean; 3, climate (summer conditions); 4, climate (winter conditions); 5, temperature; 6, vegetation; 7, economic and political; 8, population and exploration. Scale: Nos. 1, 3, 4, 5, 6 and 8, 1:6,000,000; No. 2, 1:20,000,000; No. 7, 1:4,000,000. George Philip & Son, Ltd., London, 1915. [For the special features and high merit of the series to which this and the foregoing belong, review under "Educational," *Bull.*, Vol. 44, 1912, p. 640.]

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ERRATA

p. 124, bottom, read "Paul Tuckerman, Secretary."

p. 160, second entry under World, supply side-head "Oceans."

p. 177, line 26, read "Saône."

p. 213, line 1 of first entry under Obituary, read "Hartenthun."

p. 264, line 17, read "substantiated."

p. 315, line 23 of first entry under Educational, read "which brings out."

p. 320, cancel first, third, fourth, and fifth entries under "Atlases," duplicated from p. 80.

p. 393, line 1 of first entry under Italy, read Almagià.

p. 439, footnote, read "p. 228" for "pp. 228-229."

p. 448, last line, *dele* quotation marks.

p. 481, under title, read "(map facing p. 494.)"

map facing p. 494, supply name "Providence Creek" to creek in 54° N. and 120° W. rising in 5,000-ft. pass and flowing southwest and west into South Fork of Big Salmon River.

p. 541, first entry under Africa, "Esquisse ethnologique, etc." is the main title, and not "Enquête sur la Famille, etc.," which is the series title.

p. 700, line 16 of first review, read "as between 40° and 45°."

p. 715, first title, read "Germany since 1740."

p. 798, second entry, supply author's name, "Erzherzog Ludwig Salvator."

p. 936, footnote 2, read "Vol. 44" and "p. 577."

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